TORNADO

A REPORT

Edmonton and Strathcona County
July 31st 1987

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Alberta
PUBLIC SAFETY SERVICES

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Preface

On the afternoon of Friday, July 31, 1987, a tornado ripped through the eastern part of Edmonton and parts of neighboring Strathcona County. The tornado remained on the ground for an hour, cutting a path of destruction 40 kilometres(25 miles) long and up to a kilometre wide in places, and reaching wind speeds up to 420 km(260 miles) per hour. The tornado killed 27 people, injured hundreds, destroyed more than 300 homes, and caused more than $330 million in property damage at four major disaster sites. The loss of life, injuries and destruction of property made it the worst natural disaster in Alberta's recent history, and one of the worst in Canada's history.

Few of the responding agencies and organizations had ever faced a disaster of this magnitude. This book documents their experiences, and more importantly, records their observations of what went right and what went wrong in their response efforts. Finally, it gives their conclusions and recommendations for the benefit of others who may one day have to face a disaster of similar proportions.

The reports contained in this publication are for the most part in the words of their authors. Some had to be edited for length, but all of the reports are available in full in the Tornado Archives kept in the Provincial Archives of Alberta.

A note about style and format: the 24-hour clock has been used throughout to avoid confusion. Also, metric measurements have not been used rigidly, although the metric system is the official Canadian standard of measurement. The reason for this is for the sake of clarity. If a police report said constables had to carry a "300-pound man" to safety, it would lose something in translation to convert that wording to "136-kilogram man".

Alberta Public Safety Services hopes everyone who might ever be called upon to respond to a major disaster will find something useful in this book.

Introduction

Alberta Public Safety Services (APSS) is an agency of the Alberta government which consists of two major divisions: the Disaster Services Division and the Transportation of Dangerous Goods Control Division. The mandate of the agency is to prepare for, co-ordinate the government's response to, and aid in the recovery from a major emergency, whether it be man-made or natural. In addition, the agency is responsible for the enforcement of dangerous goods legislation and the training of municipal and industrial disaster response personnel throughout Alberta.

Much of the time spent by staff of the Disaster Services Division involves contingency planning for an emergency situation and the preparation of response arrangements for any major emergency which may affect Albertans.

As part of its on-going responsibilities, APSS operates a 24-hour emergency centre so that at any time our staff can be alerted about and respond to any emergency which may affect Albertans.

The tornado of July 1987 was a major disaster which required the full resources of APSS during the four days of intensive response activity and subsequently in every aspect of the recovery programs.

The Government Emergency Operations Centre was activated shortly after 1500 hours on July 31 and, despite staff problems because of the August holiday, the centre was soon fully manned. For the next four days, there was a constant stream of media and public inquiry calls. The main function was to co-ordinate the province-wide response of specialized and general help which had to be co-ordinated and directed to the four major disaster sites.

At the same time that all of these tasks were proceeding, steps had to be taken to minimize the mass movement to the disaster sites of people and equipment that were not needed for the response effort. In every disaster, so many try to help with the best intentions that the sheer number of people all trying to get to a site can seriously hamper response efforts.

In the following pages, there are stories of human experience and endeavor that reflect considerable credit on hundreds of Albertans. The reader will find how advance planning proved its value and what went right and what went wrong. The lessons learned from this disaster have already been incorporated into current plans. There never yet has been an emergency when new lessons have not been learned, and there is always the unexpected to meet and overcome. This book describes the anticipation of, the reaction to, and the recovery from the 1987 tornado.

It begins with a description of how the tornado was forecast by Atmospheric Environment Services — the weather office — and how all the many different organizations reacted to the tornado. It tells of the

recovery from the disaster. And finally, it tells of the lessons learned that apply not only to dealing with the next tornado in Alberta but also to any major emergency. The book is not just a record of one tornado; we hope that it will be a reference book and a tool that can be used by emergency planners everywhere.

Mark Egener
Managing Director,
Alberta Public Safety Services

Weather Watch/ Weather Warning

1

A History of Tornadoes in Alberta

By Keith D. Hage

Dr. Hage chaired the committee which reviewed the weather warning system associated with the Edmonton/Strathcona County tornado of July 31, 1987. Former head of the Meteorology Division, Department of Geography of the University of Alberta, Dr. Hage is officially retired, but continues his research on tornadoes and other destructive windstorms.

Our atmosphere is constantly in motion as it responds to local and regional imbalances of pressure caused by unequal heating. On rare occasions in summer the local imbalances are extreme, and the normal atmospheric responses that we call thermals, cumulus clouds and thunderstorms are insufficient to relieve the large pressure differences. Nature then resorts to safety valves that we call tornadoes. Unfortunately for anyone at the precise location of the safety valve, the results are awesome and destructive.

A tornado or "twister" is a violent whirling wind that descends to the ground from the base of a thunderstorm cloud. It is accompanied by a cone- or funnel-shaped cloud of water droplets that usually touches ground but may be obscured from view by heavy rain or a collar of dust and debris. The destructive whirl rarely exceeds one kilometre in diameter and is much smaller than its parent cloud. Tornadoes move across the landscape, along with the parent thunderstorm cloud, at speeds typically between 20 and 70 km/h (12 and 43 mph). Most have whirling wind speeds of less than 115 km/h (71 mph) and are capable only of relatively minor destruction. Such tornadoes are classified as F0 on the Fujita intensity scale, which runs from F0 to F5.

On July 30, 1987, one day before the Edmonton tornado, an F0 tornado touched down six kilometres (3.7 miles) south of Edmonton's city limits near Nisku. It was but one of several on that day and it lasted only for a few seconds. Damage was limited to an area of less than 50 square metres (538 square feet) including the demolition of a small barn. Such weak tornadoes are quite common in Alberta but they receive little publicity because of their short lifetimes and small sizes.

Canada's deadliest tornadoes occurred at Regina, Saskatchewan, on June 30, 1912, and at Edmonton on July 31, 1987. Both were assigned intensities of F4 on the Fujita scale with maximum wind speeds of about 400 km/h (250 mph). No F5 tornadoes are known to have occurred in Canada.

Public awareness of tornadoes in Canada

The fact that tornadoes have been responsible for serious loss of life and property in Western Canada was first brought to the attention of the public by A. B. Lowe and G A. McKay in 1962 in their report: *The Tornadoes of Western Canada.* The preface to their report is as valid today as it was 26 years ago and deserves to be repeated.

> "Most Canadians think of the tornado as an United States phenomenon — a storm whose ravages are confined south of the 49th parallel. Thus when a tornado demolished the heart of Regina in 1912, Lieutenant

Governor Brown explained: 'A cyclone had come further north than ever before...had got out of its natural path and area....'

"Popular opinion in our day is not too dissimilar, for recently a leading prairie newspaper published a picture of an unusual cloud which had been seen near Morden, Manitoba. The cloud was described as resembling a waterspout; there was no recognition of the fact that it was a funnel cloud associated with a tornado.

"However, tornadoes do indeed occur on the Canadian prairies, and much more frequently than is commonly supposed. Due to rather sparse settlement on our plains, they frequently pass unnoticed, leaving as their mark only a shattered barn on some outlying farm, or a swath of uprooted, twisted trees cut through woodland. It is only when one of these vicious storms strikes through a town or village — such as Kamsack, Saskatchewan, in 1944 or Vita, Manitoba, in 1955 — that Canadians are shocked to realize they are not immune."

Similar reminders have been brought to the attention of residents east of Manitoba. In a presentation entitled "Tornado Disasters" given to an emergency preparedness conference in Toronto in 1980, M.J. Newark noted:

"Because tornadoes are a rarity for most individuals, because the damage that they cause (serious though it may be) affects only a very small percentage of the population, and because they are so localized, there has been a long held myth that they are freaks which seldom occur in Canada."

He concluded:

"...future tornadoes of similar magnitude [to that of Woodstock, Ontario, in 1979] are to be expected from one end of the province to the other, and the frequency of damage will increase as population and urbanization expand."

Some of the reasons for lack of public awareness of tornadoes in Alberta can be traced to early confusion in terminology and an understandable sensitivity to reports that might deter potential settlers. On July 13, 1905, the Calgary Herald reported in page one headlines: "Tornado Near Red Deer. Cyclone Cuts Clean Path through Forest and Plain". Under dateline Red Deer, July 12:

"A tornado passed over the Pine Lake country, ten miles southeast of Red Deer on Monday afternoon at six o'clock. No loss of life resulted, but considerable damage was done to stock and farm property.

"The disturbance was of real cyclonic proportions and cut a swath through the country as clean as if a gang of bushmen had gone through. The tornado was from three to four rods in width and its pathway can be distinctly traced over the prairies and through the forest....

"Crossing Pine Lake the twister threw up great volumes of water, and the lake was lashed into a white foam. On the opposite side where the tornado left the water, it cut into a very heavy forest, twisting the great trees off close to the ground and carrying them off like straws."

The editor of the Alberta Advocate in Red Deer was not pleased with this report. In an editorial on July 21, 1905, he remarked:

"We take strong exception to the flaring and sensational headlines used last week by the Calgary Herald....

"There was no cyclone, or tornado, at or near Red Deer last Monday.... There was at Pine Lake a small 'twister', a squall, of the nature of a tornado which unroofed one building. But Pine Lake is nearly 20 miles away and is nearer two other towns than Red Deer. But to use the word 'cyclone' is both foolish and utterly misleading. Cyclones are generally experienced in the Chinese sea; and a cyclone may be described as a hurricane travelling around a circle often of large diameter with a calm centre....

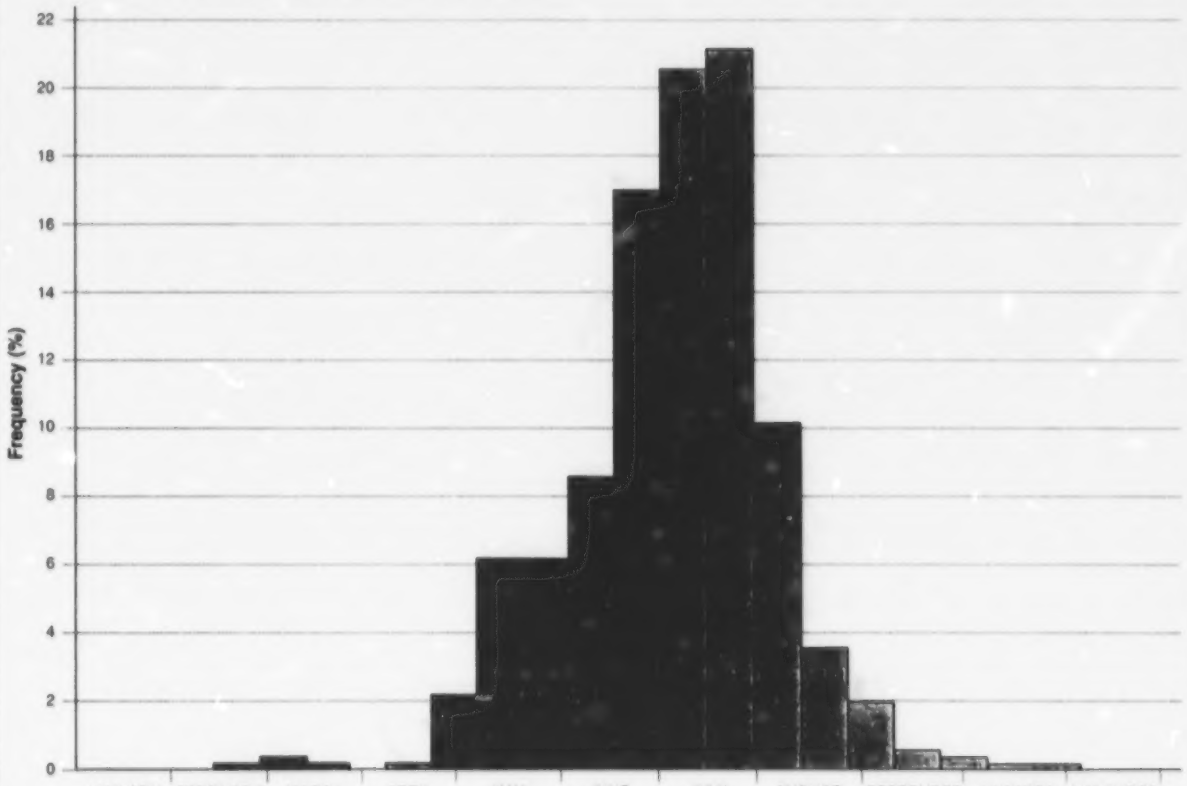
"To suffer as so many have done with their growing crops is bad enough, but we protest on behalf of this town, and moreover on behalf of Alberta against these wild, sensational, and absolutely incorrect statements, calculated to do our country injury in other parts, where the sensationalism generally grows as it is repeated."

In retrospect it seems unlikely that the Calgary Herald report of the Pine Lake tornado was exaggerated. On the other hand, the editor of the Advocate was correct in pointing out that the area affected by the tornado was much smaller than that of a typical hailstorm. The reaction of the Alberta Advocate was not unique. Many examples can be found in the archives of early weekly newspapers.

Tornado frequencies in Alberta

Although tornadoes are known to have occurred as early as February and as late as November in Alberta, the vast majority have struck in June, July and August, which are the months of most frequent thunderstorms and hailstorms. Seasonal variations in tornado frequencies for consecutive

Figure 1
Seasonal Variations in Tornado Frequencies



14-day periods are shown in Figure 1. Ninety percent of the strongest tornadoes, i.e., those that demolished at least one substantial building, have occurred between June 1 and August 15.

Annual frequencies of known tornadoes from 1890 to 1987 in Alberta are shown in Figure 2. This shows the expected increase in frequencies that accompanied the rapid increase in rural population density that took place between 1890 and 1910. The increase in tornado frequencies that occurred after 1960 has been attributed to improved observation and reporting. Yearly frequencies ranged from zero in a few years to between 20 and 30 in peak years.

Annual frequencies of tornadoes that demolished at least one substantial

Figure 2
Annual Frequencies of Known Tornadoes from 1890 to 1987

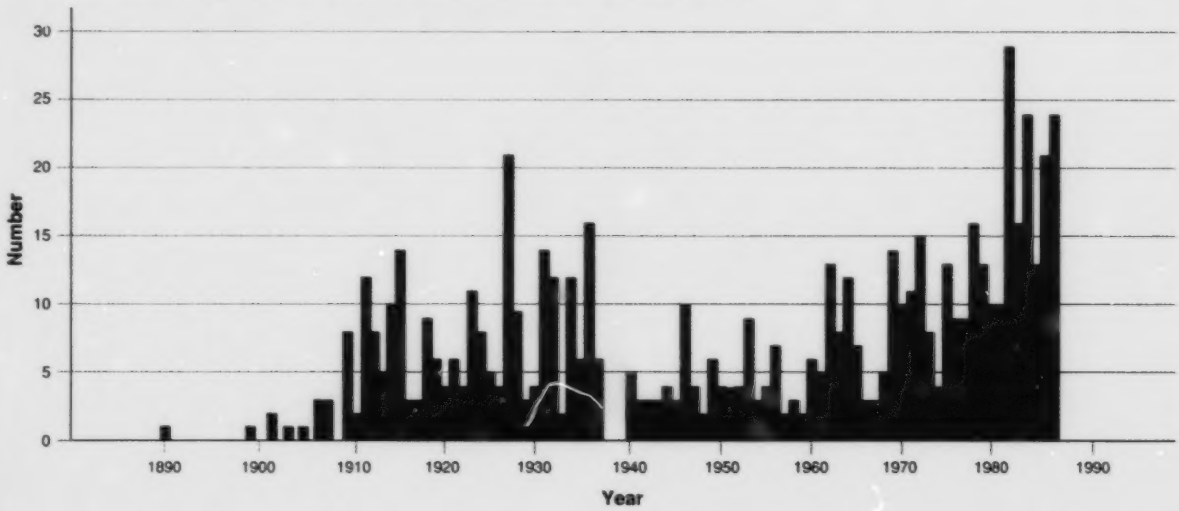
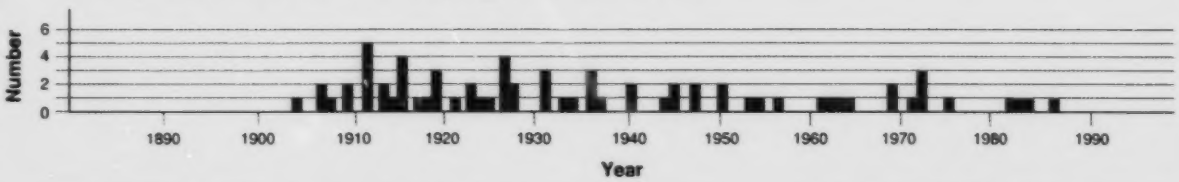


Figure 3
Annual Frequencies of Tornadoes that Demolished One Substantial Building from 1890 to 1987



building are shown in Figure 3. Comparing Figures 2 and 3 reveals that the recent increase in tornado numbers resulted from reports of weak tornadoes. This supports the idea that improved tornado reporting was responsible for the recent increase in numbers. In the absence of convincing evidence of climatic changes or other factors, the apparent decrease in the numbers of strong tornadoes following 1910 to 1930 has been attributed to the shift of population in Alberta from a widely distributed rural base to concentrated urban centres. In southeastern Alberta, this population shift began as early as 1920. If urban areas continue to expand rapidly, it seems reasonable to expect a trend reversal to an apparent slow increase in the numbers of strong tornadoes in future years unless other factors prevail.

Spatial variations in the frequencies of all known tornadoes that demolished at least one substantial building in Alberta and Saskatchewan in the years 1910 to 1960 are shown in Figure 4. Also shown are the apparent boundaries of populated (agricultural) regions of the provinces. The digits represent the total number of strong tornadoes per 10,000 square kilometres (3,860 square miles) for the 51-year period. This map must be interpreted with caution because it does not take into account rather large variations in rural population density. Where the population density is low as, for example, in the Cypress Hills region, then the frequencies of strong tornadoes as shown in Figure 4 may be underestimated.

The highest tornado frequencies in Western Canada are found in southern Manitoba and southeastern Saskatchewan. However, Figure 4 shows evidence for a secondary frequency maximum in a band parallel to the Rocky Mountains from southeastern Alberta towards the centre of the province.

Table 1 lists all known tornadoes that resulted in human fatalities in Alberta. These tornadoes were not necessarily the most severe or largest that have occurred in the province.

Table 1.
Fatal Tornadoes in Alberta
Adapted from Hage, 1987

Year	Date	Nearest Settlement	Fatalities	Injured
1879	May 16	Saddle Lake	1	
1907	August 14	Wainwright	3	
1910	July	Sibbald	1	
1912	June	Oyen	1	
1915	June 25	Grassy Lake	4	11
1918	July 30	Tolland	1	3
1919	June 21	Empress	1	1
1927	July 8	Wetaskiwin	3	
1950	August 11	Morley	4	6
1960	August 3	Travers Dam	1	3
1961	July 7	Gooseberry Lake	1	1
1972	July 28	Banff	1	2
1984	June 29	Richmond Park	1	1
1987	July 31	Edmonton	27	300

The Edmonton tornado of July 31, 1987

The last week of July 1987 was hot and humid with frequent thunderstorms over much of Alberta. Weather maps were characterized by a weak low-pressure trough over central Alberta at the earth's surface, and a strong flow of air from the southwest at high levels. As the week progressed, surface dewpoint temperatures, which are a measure of the absolute humidity or moisture content of the air, rose to near-record values at 20°C (68°F). Fourteen tornadoes, ranging in intensity from F0 to F2, were reported between July 25 and July 30 from Milo in southern Alberta to High Prairie in the north. Although significant property losses occurred, no urban centres were struck and there were no injuries or fatalities. Tornado damage path lengths in these storms ranged from about 15 metres (50 feet) on an acreage property to a maximum of about 5.5 kilometres (3.5 miles) in a forest. Most of these highly localized tornadoes were unknown to the Alberta Weather Centre until reported some days or weeks later.

On Friday, July 31, the atmosphere over Alberta continued to exhibit a high potential for severe thunderstorms and associated extremes, such as large hailstones and damaging winds. A line of thunderstorms developed first in the late morning along the foothills southwest of Calgary. These storms intensified and moved rapidly northeastward to reach a line from Ponoka to Sangudo by 1430 hours. By 1445 hours a new thunderstorm cell developed explosively near Leduc, ahead of the previous line of storms. At 1455 hours a tornado dropped to the ground from this cell briefly and retracted. It struck again near Beaumont as the "Edmonton tornado" and remained on the ground for an hour over a 40-kilometre (25 mile) path.

The track of damage exhibited rather large variations in width from a few tens of metres up to more than one kilometre. Tornado intensity estimates based on damage observations ranged from F0 (light) near the edge of the track to F4 (devastating) in intermittent patches near the centre of the track.

At least four other tornadoes, including one with intermittent touchdowns between Millet and Vegreville, occurred in Alberta on July 31. None, however, came close to the duration, intensity and path length of the Edmonton tornado.

The critical question remains: what are the special atmospheric conditions that must exist to support a tornado for more than just a few seconds or minutes? We know from events in late July 1987 and previous years that tornadoes are relatively common in Alberta when the general atmospheric conditions are favorable. These conditions are: warm, moist air at low levels, extreme instability, a capping inversion at middle levels of

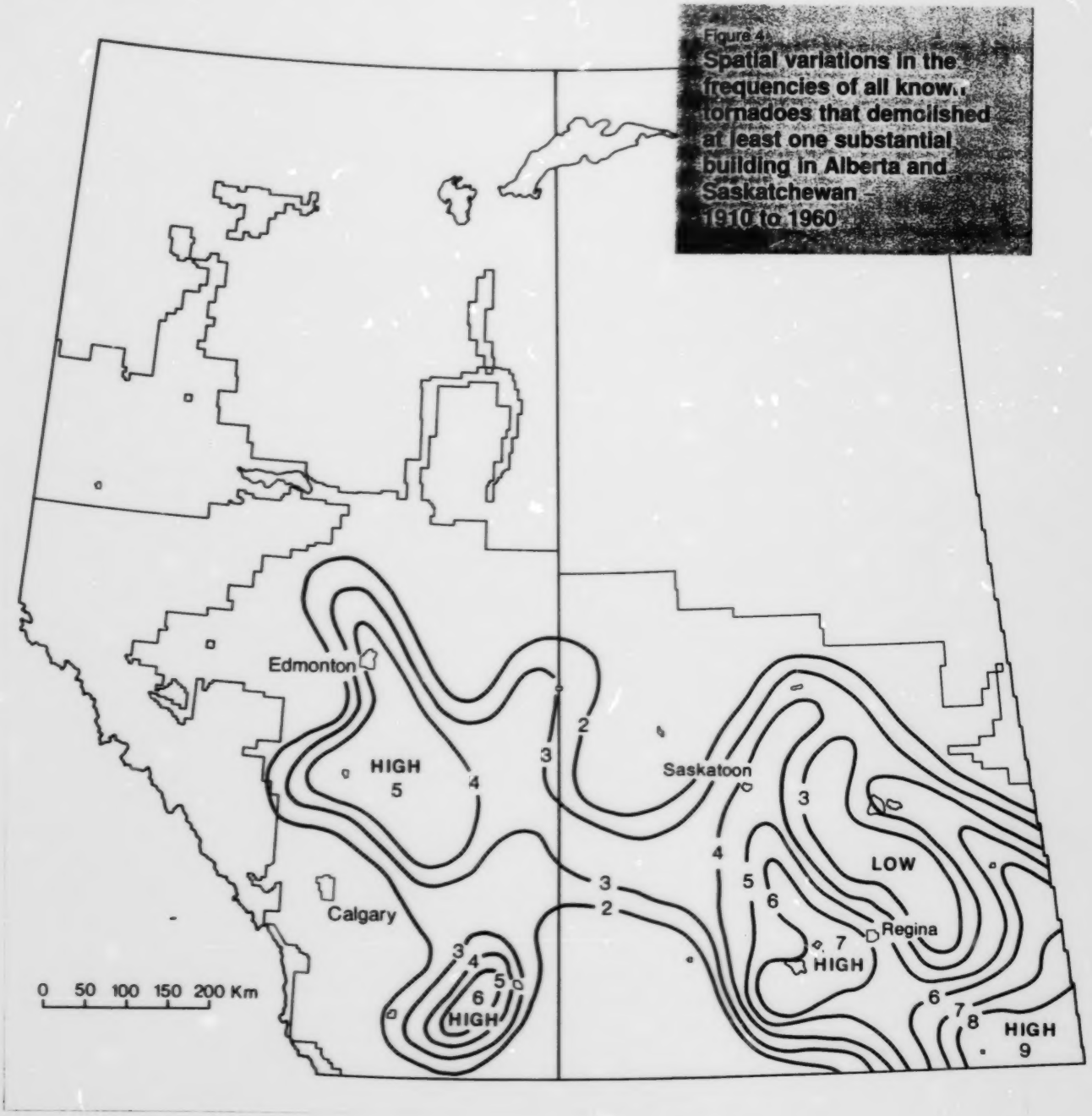


Figure 4
Spatial variations in the frequencies of all known tornadoes that demolished at least one substantial building in Alberta and Saskatchewan – 1910 to 1960

the atmosphere, and a mechanism to trigger convection through the inversion. But what additional special conditions existed in or near the Leduc thunderstorm cell on the afternoon of July 31 that resulted in a long-lasting tornado?

An analogous question concerns hailstorms. Most of Alberta's crop hail damage results on the average from one or two major hailstorms per year that have long lifetimes and cover large areas. What are the atmospheric conditions that produce such thunderstorm supercells that can persist for several hours?

Our best hope for answers to both questions lies in detailed analyses of high-resolution Doppler radar, weather satellite and conventional radar observations collected during these rare events. The large-scale atmospheric conditions that we deduce from conventional weather reporting are necessary but not sufficient for the support and maintenance of long-lived storms.

The disaster that struck Edmonton on July 31, 1987, was unprecedented in Alberta's history because a long-path tornado happened to strike a major urban centre. It is important to note, however, that tornadoes with path lengths in excess of 10 kilometres (6 miles), which are capable of causing major disasters if they strike an urban area, occur about once in two to three years somewhere in the settled regions of the province. Increased efforts to improve tornado warning skills, communications and emergency preparedness appear to be justified.

Editor's Note: The references cited in this report are listed in the References after Section 10.

The Weather Warning System:

Environment Canada, Alberta Weather Centre

By Alton F. Wallace,
Severe Weather
Co-ordinator

The Alberta Weather Centre (ALWC) of Environment Canada's Atmospheric Environment Service (AES) is responsible for issuing weather forecasts and warnings for Alberta and northeastern British Columbia. The Edmonton Weather Office (EWO), located on the same premises, is responsible for local dissemination of such information. This is accomplished through Weatheradio Canada (a continuous weather information channel broadcast over VHF-FM radio), telephone recordings, media interviews, and by responding to public requests. In addition, the ALWC shares responsibility with Emergency Preparedness Canada for educating the public about weather, about AES warning messages and their meaning, and about safety precautions that can be taken. Taken together, these three components — forecasts, communication and public awareness — make up the weather warning system.

Summer severe weather program

The Atmospheric Environment Service has a specialized program to address summer severe weather produced by intense thunderstorms in those regions of Canada susceptible to such events. The Alberta Weather Centre has had an operational severe weather program with the goal of predicting, detecting and giving early warning of hazardous weather phenomena since 1977.

During the summer, the Centre employs a meteorologist dedicated exclusively to severe weather forecasting. This person is relied upon as a specialist to provide guidance and advice to the regular forecast team. The severe weather meteorologist uses detailed mesoscale analyses to assess the stability of the atmosphere and to identify factors that would favor the development of thunderstorms. Changes to the atmosphere are predicted using a combination of forecast techniques, including kinematics and computer products. The changing environment is then incorporated into an assessment of thunderstorm likelihood. When thunderstorms are forecast, the meteorologist determines their potential severity by the strength of parameters that enhance or act against strong development.

Having determined that severe thunderstorms are possible, the forecaster then focuses on the accompanying phenomena. This includes predicting whether the storms will produce tornado phenomena (tornadoes, waterspouts, funnel clouds), large hail (walnut-size or larger), damaging winds (at least 100 km/h or 60 mph) or flooding downpours (25 mm/one inch or more in an hour). Hail, wind and rain forecasts are based on empirical techniques related to the predicted strength of the storms. No such relationships exist for tornadoes, although environments favorable to their production can be defined.

An integral part of the program is the weather watch or detection component. This involves monitoring weather developments by checking observations from weather stations, examining and interpreting radar and satellite data, and receiving or soliciting information from the Weather Watcher Network, a group of about 600 volunteers who telephone the Alberta Weather Centre when they observe hazardous weather.

"Severe weather watch" and "warning"

The weather warning system is intimately linked to the regular forecast program and the severe weather program. The regular forecast program predicts the likelihood of thunderstorms. The severe weather program, with the benefit of later data and more detailed analyses, refines the prediction to determine the threat of severe storms. Should severe storms seem likely, a "severe weather watch" is issued to alert the public. Also, weather monitoring activities in the Alberta Weather Centre are increased.

When information is received indicating that severe storms are imminent or occurring, a "severe weather warning" is issued. The sources for such information may be conditions observed by humans (weather station, volunteer weather watcher) or by machines (radar, satellite). The "warning" is used to inform the public that severe thunderstorms have developed and will affect their area.

If a reliable report of a tornado is received, a "Tornado Warning" is issued. In most cases, a reliable report will be a sighting by an eyewitness. The radars in Alberta are not capable of reliably detecting tornadoes.

Communications

Rapid communications are an essential component of the weather warning system. Regular forecasts and severe weather watches are disseminated in the same fashion. After the forecaster has formulated the statement, it is sent by AES teletype circuit to a computer in Toronto, which distributes it to weather offices and to the Broadcast News/Canadian Press computer, also in Toronto. From there it goes by teletype to all media which subscribe to the service. When forecasts are received in weather offices, it is the role and responsibility of the weather offices to ensure the information is disseminated widely via local channels.

Both severe thunderstorms and tornado warnings are accorded a high priority for distribution. The Alberta Weather Centre's procedures include telephoning the appropriate weather office (in Edmonton, this becomes a face-to-face discussion) to ensure rapid communications. The weather offices, in turn, follow established procedures for rapid dissemination. A

Weatheradio Canada tone alert signal is the first priority. Weatheradio is a special signal which is transmitted to radio receivers located in radio and television newsrooms. The signal activates an alarm to alert those in the newsroom, and then the message is broadcast. The next priority is a phone-out list to public safety agencies and the media. Telephone answering machines and public requests for information are handled on a time-available basis.

The events of July 31, 1987

In the last week of July, there were numerous thunderstorms, and reports of associated severe phenomena were received daily. On July 31, the 0500 hours forecast for Edmonton predicted an 80-percent probability of thunderstorms, noting that they would be heavy at times. The 1100 hours forecast predicted thunderstorms with hail, damaging winds and heavy downpours. Weatheradio broadcasts and interviews with the electronic media stressed "vicious thunderstorms" and "extremely strong and violent thunderstorms". The assessment of the severe weather meteorologist confirmed the threat of severe thunderstorms. Weather watch commenced. Before noon, the development of thunderstorms along the foothills in southern Alberta led to the first "severe weather watch" of the day. As the thunderstorms grew and developed northward, and began moving away from the mountains, a "severe weather watch" was issued for Edmonton at 1340 hours.

Radar and satellite indicated rapid intensification of the line of thunderstorms as it moved toward Edmonton at 70 km/h (43 mph). A "severe weather warning" was issued at 1445 hours. There had been no reports of severe events from weather stations or weather watchers. The warning was distributed using established procedures: a tone alert was sent on Weatheradio at 1452 hours, and telephone calls were begun to those on the phone-out list.

Radar showed the storms continuing to move toward Edmonton. Near Leduc a new thunderstorm began to develop ahead of the main line, and a second line of intense thunderstorms, similar to the earlier one, began moving over the western plains. At 1459 hours, a call reporting a tornado was received. The source was a member of the general public, and the information indicated that at 1455 hours a rope-like funnel had been seen to touch down briefly near Leduc. Radar indicated explosive intensification of the thunderstorm near Leduc. The decision to issue a tornado warning for Edmonton was made.

Within five minutes of receipt of the tornado report, the Edmonton Weather Office was broadcasting on Weatheradio and calls were being

made to those on the phone-out list. The warning message to be sent on the computer distribution circuit was being composed at 1507 hours and was transmitted at 1515 hours, but it had to be transmitted again two minutes later due to a "line hit". The EWO telephone answering devices were updated for the tornado warning at 1520 hours. Numerous media and public telephone requests were answered in the Edmonton Weather Office and Alberta Weather Centre.

Radar and satellite indicated the tornado storm was being overtaken by and was merging with the first line of thunderstorms. There were many reports of tornadoes, very large hail, strong winds and heavy rain. At 1530 hours the tornado warning was updated and the area coverage extended. The proximity of the tornado to the ALWC/EWO offices forced the evacuation of staff to the basement of the building beginning at 1535 hours. Power and communications failed. But within 10 minutes staff had returned and auxiliary power was available shortly thereafter. Communication of warnings began anew. The tornado dissipated around 1600 hours.

In addition to the massive Edmonton tornado, the two lines of thunderstorms produced four other tornadoes elsewhere in the province. Funnel cloud reports along the second line of storms necessitated maintaining the Edmonton tornado warning until 1900 hours. Those thunderstorms produced wind gusts to 110 km/h (68 mph), heavy rain and hail.

The weather warning system issued "severe weather watches" and "warnings" for much of central and southern Alberta on July 31 in addition to those issued for the Edmonton event.

Review of the weather warning system

In the wake of the tornado, the federal minister of environment commissioned a review of the weather warning system. Dr. Keith Hage, former head of the Meteorology Division, Department of Geography of the University of Alberta, chaired the review team. Its purpose was to analyze the existing system and recommend improvements that would result in more effective public warnings of dangerous weather conditions. The review was conducted during September and October of 1987.

Information for the study was obtained from briefs, interviews, surveys and publications. Sources included the media, general public, industry, the Atmospheric Environment Service, Alberta Research Council and the University of Alberta. After intensive data gathering and assimilation, analysis revealed a number of weaknesses leading to a series of conclusions and recommendations.

Hage concluded that "...Weather forecasts and [the] early afternoon severe weather watch issued...on July 31, 1987, were excellent...."

Furthermore, he wrote: "The Tornado Warning...for Edmonton on July 31 was remarkably timely...." Nonetheless, there were problems. The weather warning communication procedures, "proved to be too complex, and too time consuming for the Tornado Warning". Continuing efforts to educate the media and public about the warning program, severe storms and tornadoes were to little avail: "Public awareness of the possibility of such an event and public understanding and awareness of Environment Canada's Severe Weather Watch/Warning Program were inadequate."

The recommendations were structured to address the weaknesses identified in the areas of meteorology, communications and public awareness. When Tom McMillan, federal minister of the environment, formally accepted the review document in November 1987, he acknowledged the need for change and committed his department to action on each recommendation.

Changes to the weather warning system

Responding to the ministerial commitments, the Atmospheric Environment Service has instituted, or is in the process of instituting, a number of changes. Action is occurring across a full range of recommendations, but in recognition that maximum impact and benefits will be achieved in public awareness, efforts in this area have been given a higher priority.

It was accepted that the public and the media had a poor understanding of tornadoes and severe storms, their likelihood of occurrence, and what actions should be taken to minimize risk. Attempts to educate the public had been mostly passive and obviously ineffective. The AES will take a more active role in the future to address this problem. Activities include:

- production of a video program, "Stay Alert...Stay Alive", designed to inform people about storms, Environment Canada's warning terminology and recommended safety precautions
- making similar information available in the Edmonton telephone book
- publishing a fact sheet that details information on Alberta tornadoes
- sponsoring annual severe storm awareness days
- scheduling seminars with the media and public safety agencies
- staffing an emergency preparedness meteorologist position to oversee improving public awareness, communications and regional preparedness.

The communications component of the weather warning system had functioned well in most instances. When near instantaneous and simultaneous dissemination was required, however, the communications

system was inadequate. To address these deficiencies, the Atmospheric Environment Service:

- has replaced the Edmonton Weatheradio studio and is working to improve the broadcast signal and strength
- has concluded agreements with federal and provincial agencies to use Weatheradio in the event of emergencies.
- is installing telephone auto-diallers to ensure all media and safety agencies are notified quickly
- is investigating technology that would allow simultaneous telephone dissemination to multiple users
- is holding discussions with television and cable operators aimed at increasing their role

While the severe weather program in Canada, and at the Alberta Weather Centre in particular, was found to require some refinement and revision, the procedures and techniques to forecast severe storms were, nevertheless, functional. The weather centre lacked the technology to detect the tornado earlier. However, this is a problem in many parts of Canada and will be acted upon. The following are longer-term solutions due to large funding requirements. Specifically Atmospheric Environment Service has:

- purchased a satellite workstation for installation
- begun developing a submission to the federal cabinet requesting approval and funding for a network of Doppler radars
- developed a prototype radar data processing system that is scheduled for operational implementation in 1990
- scheduled the replacement of the computer system beginning in 1989
- held meetings with the Canadian Meteorological and Oceanographic Society and the Private Sector Association to resolve problems with private meteorologists
- implemented new warning terminology
- reviewed, revised and refined forecast procedures
- established communication priorities
- began recruiting amateur radio operators into the Weather Watcher Program
- held the first annual severe weather workshop for meteorologists
- developed a system to use artificial intelligence to assist the forecaster
- supported severe storm research through the Prairie Extreme Weather Program.

Hage concluded that: "No earlier warnings could have been issued on the basis of the information and technology available...." The Atmospheric

Environment Centre had a functional weather warning system, but the system was not equal to the tasks imposed by the Edmonton tornado event. The weaknesses and problems were identified by an independent review, and Environment Canada and the AES are acting to make the necessary changes and improvements.

The Hage Report

Review of the Weather Warning System Associated with the Edmonton Tornado of July 31, 1987

After the tornado that struck the eastern outskirts of Edmonton on July 31, 1987, the federal environment minister commissioned a review of the weather warning services provided in association with the event. Dr. Keith Hage, former chairman of the Meteorology Division of the Department of Geography at the University of Alberta and renowned expert on prairie tornadoes, headed the review team.

The following is a summary of Dr. Hage's report and his recommendations.

Weather forecasts issued during the morning and early afternoon of July 31 for Edmonton revealed a clear recognition by Environment Canada of high potential for unusually severe thunderstorms that afternoon. Environment Canada responded swiftly upon receipt of the first report of a tornado from an observant citizen. Dissemination of a tornado warning commenced only four minutes after the first report.

A review of the events and circumstances on July 31 has shown that an earlier warning of the tornado was not possible because Environment Canada's severe weather forecasting team in Edmonton did not have the technological capability for detection or prediction of the tornado before it touched down. Superior technological capabilities that exist now in the United States cannot guarantee that positive lead times will be achieved for all tornado warnings, but offer real promise of additional precious minutes of warning for most severe tornadoes.

The review has uncovered a number of weaknesses and deficiencies in the methods of communication of severe weather information to the public and in public awareness of Environment Canada's severe weather warning program. Communication problems can be remedied by Environment Canada Communications, the Canadian Radio-Television and Telecommunications Commission and broadcast media. However, deficiencies in public awareness will require enhanced and continuing public education programs supported by Environment Canada, Emergency Preparedness Canada, provincial public safety agencies, the media and the public.

We recommend to the minister of Environment Canada that the following actions be taken to correct the weaknesses and deficiencies that have been identified in this review. Our specific recommendations are presented in decreasing order of urgency under each of the three main topics of study.

Meteorological aspects

1. Significant increases in regional capability for utilization of existing weather radar and geostationary satellite data are needed urgently in some regions. These increases can be achieved by (a) suitable upgrading of the speed and capacity of data links between radar

sets and the Weather Centres, (b) suitable upgrading of Weather Centre minicomputer capacity and speed, (c) acquisition of digital geostationary satellite data, and (d) acquisition of data processing systems that will yield volume scanning products and others known to be useful for severe storm detection and forecasting.

2. Environment Canada's written procedures for the preparation of Severe Weather Warnings should be greatly expanded to explain and illustrate the vital importance of terminology and information content. Provisions are needed for increased supplementary information on threat confirmation, threat location, threat severity, and recommended actions that take into account established sociological findings on public response to warnings.

3. Steps towards regional implementation of Doppler radar, perhaps by retrofitting of existing radars, should be initiated before completion of current tests at King City, Ontario. It is essential that acquisition of Doppler radar hardware be accompanied by personnel training and acquisition of data processing technology needed for regional tests and operational implementation. Doppler radar represents a major improvement in technology with wide applications that include, but are not limited to, severe storm forecasting.

4. Confronted by evidence of rapidly developing thunderstorm cells, the severe weather forecaster faces an impossible task in trying to identify, integrate and synthesize the salient features of vast amounts of data from conventional, radar and satellite sources. Interactive computer processing technology and artificial intelligence methods such as expert systems offer some hope of solution to this problem. Solutions must be found.

5. Regional procedures for the Severe Weather Watch/Warning program should include (a) an annual review of local communication priorities and identification of local agencies that must be informed quickly about warnings, and (b) an annual reminder to Weather Offices and Weather Stations that play a role in local communication of Severe Weather Warnings.

6. The Government of Canada and the governments of provinces affected by severe summer weather should encourage and support research to improve early detection and prediction of severe local storms including tornadoes.

   For example, recent proposals by Alberta Research Council staff members for severe storm research deserve serious consideration. We

can ill afford to lose research expertise in severe storm forecasting, radar data processing and artificial intelligence.

7. Environment Canada should solicit the active participation of amateur radio operators in the Severe Weather Watch/Warning program. If interested operators are alerted on mornings with high severe weather potential, they can play a vital role in severe weather reporting, communication backup and tornado tracking. In Edmonton, and perhaps in other cities, an amateur radio base station already exists in the offices of public safety services agencies.

8. Environment Canada should encourage and support periodic national workshops for severe weather forecasters for the purpose of exchanging information.

9. Western Region should conduct a post mortem on (a) the failure of the Uninterruptible Power Supply, (b) the failure of the Weather Watch phone, (c) the communication failure for what might have been a crucial, reliable tornado report from Edmonton International Airport, (d) the loss of radiosconde data from Stony Plain, and (e) the loss of digital radar data from Carvel on July 31, 1987. Redundancy provisions are needed.

10. Environment Canada should meet with private weather forecasting services that operate in Canada to resolve the problem of independent issuance of tornado warnings. Environment Canada should solicit the advice of the Canadian Meteorological and Oceanographic Society in this matter.

Communications

1. Weatheradio must be improved in received signal quality; expanded in coverage; recommended, and advertised strenuously, especially to the broadcast media, industry, institutions and housing complexes. It is operational now and can serve as an interim alert system across Canada not only for weather warnings, but also for other short-period warning requirements that may result, for example, from nuclear accidents or toxic cloud releases.

   Federal and provincial co-operation in this matter is essential.

2. One-way simultaneous live and recorded telephone communication systems should be implemented for rapid communication of Severe Weather Warnings and supplementary information to the broadcast media and public safety services in large metropolitan areas in Canada.

3. Television must play an increased role in the communication of Severe Weather Warnings to the public and in public education. Tone alert is needed to attract attention. The merging of graphics with warning text should be explored. The assistance of the Canadian Radio-Television and Telecommunications Commission is needed for clarification of the rights and responsibilities of television stations and cable television companies for broadcast of Severe Weather Warnings by program interruption including the use of crawlers and voice-over.

4. Efforts on the part of the Department of Communications and Emergency Preparedness Canada to design and implement a feasible national warning alert system should be strongly supported by Environment Canada, provided that such a system is flexible enough to include local warnings for local recipients and provided that such a system is capable of triggering home alarm signals or activating radio or television receivers.

Public Awareness

1. One full-time emergency preparedness meteorologist position should be created in each Environment Canada region with a Severe Weather Watch/Warning program. Such persons would be responsible for upgrading and maintaining regional preparedness levels in each of the meteorological, communications and public awareness aspects. They would be expected to promote and encourage strong liaison among Environment Canada, Emergency Preparedness Canada, Department of Communications, provincial public safety services and broadcast and print media.

2. Annual severe storm awareness days or weeks should be held by Environment Canada and publicized by broadcast and print media just before the severe storm season in each region. These should include short, concise media briefings conducted by individuals thoroughly familiar with severe weather forecasting technology and terminology.

   In addition, public education activities should be stepped up immediately following major urban or rural severe weather events.

3. Information materials summarizing current general knowledge about "safe" and 'unsafe" places should be prepared for large and small industries, small businesses, and mobile homes or trailer parks. Emergency Preparedness Canada should co-ordinate the preparation of this material and facilitate the collection of data by arranging for site visits of wind-ravaged structures by a small national team of structural

engineers. Such arrangements should be made beforehand on a continuing annual renewable basis so that site visits can be initiated on very short notice.

4. Environment Canada should encourage and support periodic workshops or seminars for the purpose of exchange of information among Weather Centres, provincial public safety agencies and regional representatives of Emergency Preparedness Canada and Department of Communications.

Government Emergency Response 2

Government of Canada

This is a summary of a report prepared by Jim Hoffman, Regional Director, Alberta and Northwest Territories, Emergency Preparedness Canada (EPC). EPC is responsible for co-ordinating the response of the federal government in an emergency or disaster.

In 1980, the federal cabinet approved a set of procedures for crisis management of federal agencies in disasters. These procedures outlined conditions under which the federal government would respond to emergencies.

Responsibility for responding to most peacetime emergencies, including the Edmonton/Strathcona County tornado of 1987, is clearly within the jurisdiction of provincial and local authorities. However, some federal agencies, such as Environment Canada's Atmospheric Environment Service (AES), are an important part of the infrastructure of the local community. AES played the primary federal role in the alerting period that preceded the tornado on the afternoon of July 31, 1987, and continued to provide weather information throughout the disaster period. (See the report in Section 1 on Alberta Weather Centre.)

Immediate post-disaster period

The Department of National Defence placed helicopters and ambulances on standby at Canadian Forces Base, Edmonton, and provided reconnaissance flights for the City of Edmonton and the deputy prime minister.

At the onset of the storm, Emergency Preparedness Canada (EPC) established contact with the Alberta Government Emergency Response Centre. EPC established a liaison office at the response centre at approximately 1800 hours that same day.

During this phase, Emergency Preparedness Canada contacted its headquarters in Ottawa and, with the co-operation of the province, began to identify assistance that might be needed. The EPC Edmonton office also provided information to members of Parliament including the federal cabinet.

A number of federal departments were alerted to participate in a meeting on the morning of August 1.

As emergency personnel sprang into action in the industrial area, potential threats from dangerous goods came to light. Alberta's Compliance Information Centre (CIC) dispatched its dangerous goods inspectors and the provincial environmental response team to the area. The centre has an ongoing relationship with the federal dangerous goods response centre of Transport Canada (CANUTEC) in Ottawa. There were several instances during the evening in which the Compliance Information Centre requested CANUTEC to provide advice and assistance. (See The Dangerous Goods Response to the Industrial Area, a report in Section 5 by the Compliance Information Centre of Alberta Public Safety Services.)

Analysis period

The fundamental concept of emergency response sees those directly affected by an emergency as the first line of response, supported by local, then provincial, and then federal resources if needed.

This process provides the third level of support with time to assess the situation and prepare strategies.

The federal analysis period began late on the evening of July 31. Federal departments of Employment and Immigration (CEIC), Health and Welfare (HWC), Regional Industrial Expansion (DRIE), Canada Mortgage and Housing (CMHC), and the Federal Economic Development Co-ordinator (FEDC) were alerted to identify what contingency services they could provide to those dislocated or to businesses that had been destroyed as a result of the disaster. Simultaneously, EPC contacted the Ontario Emergency Preparedness Office to obtain relevant material on the tornado in Barrie, Ontario in 1985.

The deputy prime minister, accompanied by the secretary of state for external affairs and regional directors of Emergency Preparedness Canada and CMHC, conducted an aerial inspection of the damaged area on the morning of August 1. Concurrently, the EPC regional director asked Alberta's Government Emergency Response Centre to identify areas in which it required additional information and then requested that Canadian Armed Forces conduct a photo reconnaissance to cover those areas.

The official aerial inspection was followed by a meeting of representatives of the above named departments and ministers to discuss federal involvement. The following strategy was accepted for presentation during discussions with Alberta:

1) Continued co-operation would be offered, to be concurrent and co-operative with Alberta's recovery program.
2) CMHC would offer assistance with utilization of vacant units, initially rent-free, and with assessment of damaged property.
3) The federal departments of Regional Industrial Expansion, and Employment and Immigration would meet with affected industries to identify their needs.
4) Employment and Immigration would apply its Canadian Jobs Strategy Program and expedite Unemployment Insurance Commission benefits for those entitled.
5) A one-stop, drop-in centre would be recommended for federal and provincial social programs to disaster victims.
6) If (5) was not agreed to, Employment and Immigration, the Canadian Mortgage and Housing Corporation and the federal Health and Welfare

department's Income Security would open a service centre in northeast Edmonton.

7) Requests for Disaster Financial Assistance Arrangements (DFAA) would be responded to positively with the widest possible interpretation of eligibility.

The deputy prime minister advised that he would co-ordinate ministerial activities and that the regional director of Emergency Preparedness Canada would be the federal co-ordinator in the region. The Federal Economic Development Co-ordinator would assist Emergency Preparedness Canada with communications support. Federal officials would attend Alberta's recovery program discussion late on August 1.

An unusual aspect of the strategy was to offer the province access to the Disaster Financial Assistance Arrangements. The normal process is for the province to request the federal government to provide assistance. Because of the dimensions of this disaster, the deputy prime minister did not await this request.

Assistance centres

The first major intergovernmental meeting was held at 1600 hours on August 1. Approximately 20 local, provincial and federal agencies, under the chairmanship of Alberta Public Safety Services (APSS), met to identify how the interim needs of those affected by the disaster would be treated and to examine longer-term recovery needs. Alberta and Emergency Preparedness Canada had explored the one-stop service centre approach in 1976-77, so the concept was available to be applied to the tornado. (In the one-stop approach, victim services agencies set up together in one location to make the process of recovery easier and more convenient for people affected by disaster.) Following approval by the provincial executive, a larger meeting was held on August 2 under the guidance of Alberta Public Safety Services to work out the details of the opening and operation of the centres.

For the next 11 days the primary activities of the federal government were focused on individual services provided by its agencies at the assistance centres. (See Victim Assistance Centres in Section 7.) These included:

- Employment and Immigration Canada registered 725 claims for unemployment and provided service to another 60 clients related to replacement of Social Insurance cards and immigration records. Their counselling service under the Canada Job Strategy program was available to business people hit by the tornado.

- Health and Welfare Canada (Income Securities) served 204 clients. Services included: address changes for Old Age Security, Family Allowances and Canada Pension Plan (CPP) cheques and counselling and arrangements for CPP survivor benefits.
- Canada Mortgage and Housing Corporation registered 104 housing requests and housed 62 families in existing CMHC units. The first month was rent-free and subsequent rent charges were tailored to meet the financial conditions of each family. CMHC and Alberta Mortgage and Housing Corporation offered the same services and pooled details of the available vacant units so that clients could choose from the inventory.

Road to recovery

On the evening of August 3, the prime minister arrived in Edmonton on a visit that had been planned well before the tornado. Emergency Preparedness Canada arranged with the Canadian Forces to provide helicopters for the ministerial party to view the damaged area.

Meanwhile, Emergency Preparedness Canada consulted with Alberta Public Safety Services about longer-term assistance and recovery programs. First to be considered was assistance to people directly affected by the tornado. The Alberta government felt there was a need to provide extraordinary assistance to those directly affected by the tornado, beyond the provisions of the Disaster Financial Assistance Arrangements (DFAA) in the areas of transportation costs, assistance with insurance shortfalls and rehabilitation assistance. Officials of both governments maintained a continuous dialogue on the matter. By August 12, Emergency Preparedness Canada was able to advise Alberta officials that the proposed provincial policy for assistance was acceptable for cost sharing under DFAA.

Focus of the federal officials now shifted to longer-term needs for recovery and assistance in the entire area affected by the weather system including the northwest area of the province, which experienced major flooding on August 2 and 3.

In Edmonton, the EPC regional director requested assistance of advisors from Employment and Immigration, Regional Industrial Expansion and Agriculture Canada to help develop recovery programs. While such programs were the prerogative of the provincial government, federal officials were to be active participants in identifying recovery options. Federal discussions started on August 8 and included gathering an index of federal services that might be offered to help the agricultural and business sectors.

The Emergency Preparedness Canada regional library was searched for information on recovery programs, while the Alberta government searched

information banks throughout North America related to recovery programs in similar circumstances (Barrie tornado, 1985; Rapid City, 1972; Wichita Falls, 1979; and Mobile, 1979). It was evident that the devastation in the Alberta industrial sector was greater than in any of these disasters. A "super outbreak" in a 10-state area in 1974 involved 148 reported tornadoes which collectively caused $600 million in property loss. By now there were indications that this one event in Edmonton would come close to the total value of property losses of the 148 tornadoes in 1974.

On August 12, federal and provincial officials held a brainstorming session to develop a list of options for a recovery program. A number of unusual factors had to be considered. First, the social and economic costs were staggering. The numbers of those dead, injured and displaced from their homes were dramatic. The value of loss was estimated to exceed well over one-third of a billion dollars, while it was estimated only $250 million would be covered by insurance. Recovery would be unlikely without significant government support.

Information available on August 12 indicated that of the small businesses affected (from one to 20 employees), most owners had less than 20 percent equity in their businesses. None suffering catastrophic losses had any business interruption insurance coverage; most were dramatically underinsured. For medium-sized businesses (21 to 100 employees), the equity position was less than 30 percent; approximately 60 percent of these were underinsured.

Within these sectors, approximately 1,500 jobs were jeopardized by the tornado. Another 1,500 jobs had been prejudiced in large businesses such as Stelco and Canada Packers. The insurance picture in the disaster area was not considered to be unusual by government risk management advisors or the insurance industry.

Another factor in determining the assistance program was the need to begin restoration rapidly. Studies in other disasters had concluded that delays in restoration would compound future recovery.

Officials had to deal with the expectations of both political and public audiences. Ministers wanted to initiate recovery programs as quickly as possible. In the public sector, there were expectations that a great deal of assistance would be provided. On the other hand, care had to be taken to ensure that assistance to those affected by the tornado would not be perceived as being unduly preferential with respect to other victim groups.

The prime concern of recovery programs for industry was to ensure the continuity of the business, thereby preserving jobs. All elements of the program had to be directed toward this end. In the Edmonton area, there was considerable evidence of social responsibility by employers keeping their workers on at full rates to assist in recovery and clean-up.

After several days of discussions, Alberta Economic Development and

Trade prepared a recovery proposal for consideration. On August 20, EPC convened a meeting of officials from Regional Industrial Expansion (DRIE) and Agriculture Canada to examine the proposed programs for industrial and agricultural assistance. The industrial program ensured that loan credits were based on job retention performance rather than on ex gratia grants. It was agreed that this program provided the flexibility to deal with each industry individually to meet the objectives of the recovery and that the agricultural program was a reasonable and responsible approach to meeting these objectives as well. After discussion regarding the degree to which these special programs might be shared by the federal government it was agreed that:

1) With the exception of the grants and loan contributions being considered by Alberta, all other elements of the assistance program had been employed in some form in other disasters.
2) The grants and loan contributions were essential to the objectives of re-establishing businesses, considering the equity position of most businesses and farms suffering catastrophic loss.
3) There should be recognition of the $20- to $30-million benefit in job retention contained within the Alberta program.
4) There was a need to credit the extraordinary long-term management costs inherent in delivering this program over the next one to two years by Alberta.
5) It would be inequitable to ask a region with 10 percent of the national population to carry a share exceeding 25 percent of the burden of the recovery program of this magnitude.

The recovery programs announced by Alberta were subsequently accepted as eligible for cost sharing under the Disaster Financial Assistance Arrangements formula.

The need for a unique recovery program to meet a disaster of this nature is not unusual. Most government programs are designed for delivery of services based on a methodical approach to a needs analysis and accountability in normal times. The approach adopted in concert by both governments ensured that the expertise of all relevant federal and provincial agencies was incorporated in identifying the elements that could contribute to a recovery program. But, because these agencies' funds are subject to strict legislative controls, they lacked the flexibility to deliver short-term programs to meet unpredictable needs.

In essence, the approach by the federal and provincial governments was to have the experts design the programs, but to fund the programs under disaster assistance arrangements existing in both jurisdictions.

One interesting note about the development of the options listed for the recovery program was the difficulty in breaking away from traditional think-

ing. A considerable portion of the initial discussions appeared to be related to developing a mental breakaway from the normal approach to established programs and toward the innovative development required to address this unpredictable circumstance in a compressed time frame.

In considering the money that would have to be re-allocated from existing federal and provincial resources for the recovery program, it was necessary to put a value on the benefit of retaining jobs. Factors taken into account included the value that economic development and job creation agencies put into the creation of a job; the value of Unemployment Assistance payments for an average position; the social cost in various services that would have to be delivered if the job were lost; and the amount of tax revenue that would be lost if the job were lost. The input costs per job under existing programs is somewhere between $15,000 and $20,000. A value of $10,000 per job was accepted by provincial and federal officials as a factor in determining performance of industry related to forgiveness on loans.

It was projected that federal investment would be in the neighborhood of $6,000 per job, based on the provincial assistance program.

The recovery programs agreed to by the federal authorities for sharing under the Disaster Financial Assistance Arrangement included the normal elements of disaster assistance plus those extraordinary support elements required to deal with catastrophic loss in the family, agricultural and business sectors. Table 2 below outlines the enhanced suport program agreed to for sharing.

Table 2
Catastrophic Loss

	Re-establishment Assistance $	Transportation Assistance $	Loans $
Individual/ Family	2000/adult 500/minor max. 5000	500	0
Business (including Agriculture)	15,000 max.	0	• For insurance shortfalls • For cost of recovery 2 years interest free forgivable, based on performance established in a business plan, to a maximum of 80 %

The assistance programs will continue for some time. More than 250 industries and about a dozen farms suffered catastrophic loss.

Based on estimates in mid-February 1988, government assistance and recovery programs are projected to cost $60.3 million, with the federal contribution amounting to $44.9 million.

For future consideration

Observations have been made in some government sectors that the relationship of the deputy prime minister to a regional official, while proving to be expeditious, was too unusual to be conclusive. This thinking is erroneous.

Regional ministers have provided active leadership three times in recent history, including the Barrie tornado of 1985. And this is likely to occur again. The result is to create almost a quasi-department which will treat the immediate needs of the emergency and then disappear once the services have been delivered.

Where the needs are regional in nature, this appears to be an appropriate mechanism. The federal strategy can be determined based on needs identified by ministers and officials most familiar with the conditions in the area. This is not meant to lessen the ultimate authority of central agencies; however, experience suggests that this system works well and responds to needs expeditiously and responsibly.

Lessons revisited

A wealth of material is available on disaster studies and little can be identified in this event that differed from the conclusions of existing studies. However, a number of conclusions might bear reinforcing:

1) The crisis management procedures approved by cabinet in 1980 provide for Emergency Preparedness Canada to be the primary agency to co-ordinate the federal response in a disaster such as this. This guidance appears to be adequate.
2) Over the past 15 years, activities of regional/federal officials have been based on a generic response to emergencies. Where an actual causal agent could be clearly established, planning was dedicated and detailed, e.g. the potential for foreign animal disease outbreaks in Alberta.
3) This approach to generic planning and focusing on specific, clearly identified conditions provided a blueprint for application in this tornado. It has been established in studies of other events that a significant legacy to generic or focused preparedness can be transferred to unenvisaged events.

4) The view that disasters are qualitatively different from emergencies has been reinforced in this event. In a disaster the social and infrastructural systems break down. The great complexity of disasters under these conditions requires co-ordination by feedback and not by plan. Delivery of services by various government agencies was effected through a continuous process of feedback between the line agencies that were leading in their traditional areas of expertise. The federal co-ordinator, Emergency Preparedness Canada, acted as a broker to ensure consistent application of the federal strategy and to assign tasks as they emerged.
5) It has been shown in previous events that the success of any agency in the preparedness or response field is determined by its experience, whether its function is recognized by other agencies, whether its credibility has been established through proven performance, and whether it has had a well-established pre-disaster relationship with fellow agencies. These conditions did prevail between the federal and provincial emergency agencies in this event as well as between the federal co-ordinator and the federal agencies contributing to the programs.
6) The mythical perceptions of the Canadian Armed Forces' capabilities to muster large numbers of personnel on short notice to assume any and all tasks still seems to exist in the civilian community. Some senior emergency services officers of local government commented that the military should have been called in to direct the search and rescue operations. In fact, there was no apparent shortcoming in the conduct of the civil search and rescue and security operations. There is a continued need for provincial authorities to disavow local officials of the perception of the Canadian Armed Forces as "a major resource sitting in the wings".
7) Preparedness for emergencies should be an unending process of planning between agencies and governments in a mutually reinforcing way. This includes continuous communication supported by the stamp of authority of the governments involved.
8) The manner in which the City of Edmonton placed its disaster services program in the Executive Branch and the method with which the Alberta government treated disaster services as a full-fledged program of government, augured well for preparedness for this disaster.
9) When an event draws national and international attention, a mass of resources often pours upon the scene, and often these are loaded upon volunteers or agencies not designed to cope with a mass assault. As a result, some volunteer agencies had to be reinforced by government support rather than vice-versa.

10) One of the major factors contributing to the federal government's ability to respond to the needs of the province in mustering its disaster recovery program was the flexibility inherent in the guidelines for the Disaster Financial Assistance Arrangements. This flexibility is its major strength and should not be tampered with.
11) The role of the regional minister has on three occasions in the past decade proven to be extremely effective in crisis management. This influence should be seen as a positive contribution.

Co-ordination

Co-ordination is "the essence of good planning and operations" in disaster response. In disaster response involving a number of federal departments, the co-ordination function falls naturally to Emergency Preparedness Canada.

The lead department concept came into full force with cabinet decisions on new initiatives for emergency preparedness in 1980. The concept is based on employing departments and agencies in tasks in which they have traditional or latent capability. In effect, the department leads in its own area of expertise.

Concurrently there is a requirement for co-ordination between operations, agencies and governments in complex situations. Co-ordination:

- identifies the strategic focus for groups or organizations
- provides a common understanding and dedication to objectives
- ensures concurrent and related activities are properly blended
- eliminates duplication
- incorporates and assigns emergent tasks
- measures progress and corrects deviations from the overall strategy

Studies have unanimously identified co-ordination as the essence of planning and response to emergencies. This does not result in the prerogatives of specialist agencies being subsumed. The co-ordination process ensures that the traditional capabilities of government agencies are effectively employed in each of their areas of competence.

Alberta Public Safety Services, Government Emergency Operations Centre

The Alberta Public Safety Services (APSS) response system is based on the Compliance Information Centre (CIC). The centre is manned around the clock, seven days a week, by compliance officers on 12-hour shifts. Their chief responsibilities are to answer questions on the shipping of dangerous goods and to respond to incidents that involve dangerous goods and other emergency situations.

A senior duty officer from each of the Disaster Services and Dangerous Goods Control divisions is available on call to the compliance officer. All emergency calls come to the CIC/Duty Centre, either routed through the receptionist or directly via a 1-800 telephone number.

Most incidents are handled by the CIC compliance officer with advice and assistance as necessary from the appropriate divisional duty officer. In emergencies, the duty officer activates the Government Emergency Operations Centre (GEOC) in accordance with standard operating procedures whenever the following circumstances occur:

1) the duty officer's workload strains his ability to function effectively
2) there is a threat of an evacuation of a community or a significant portion thereof, or an evacuation has occurred anywhere in Alberta
3) a response headquarters is being set up by a municipality or other organization to deal with an emergency
4) the emergency has, in the opinion of the duty officer or the executive officer, the potential of becoming larger in effects, geography or time

The duty officer may use his discretion to activate the GEOC partially or fully, depending on the circumstances.

As a result of exercises and previous emergencies in 1986 and 1987, during which the GEOC was activated, a set of up-to-date procedures was published in May 1988. The procedures provide checklists for each position and outline responsibilities in detail. Each member of the agency has a copy.

The GEOC is maintained in a state of readiness with each work station fully equipped. Reference materials, such as municipal peacetime emergency operations plans and petroleum industry emergency plans, are updated regularly.

When the GEOC is activated, the duty officer calls in the appropriate staff from APSS and alerts the province's Public Affairs Bureau to staff the Public Media Information Room (PMIR). Government departments with a role to play also send representatives to the GEOC. Within a relatively short time, the operations staff is in the GEOC collecting information. All involved agencies and municipal, industrial and government departments (particularly those with field staff) are requested to report information regularly. Requests for assistance, such as helicopter support or provision

of sandbags, etc., are processed to the appropriate agency. The GEOC may send a liaison officer to the emergency site(s).

The PMIR is kept fully informed and usually has a representative in the GEOC.

The GEOC primarily uses the telephone system for its communications. However, the government Multi-Departmental Mobile Radio System can be accessed and the Alberta Amateur Radio Emergency Service (AARES) is also available to provide back-up communications. APSS has its own licensed radio station, VE6 ACD, which AARES members test and operate as necessary.

Friday, July 31, 1987 — 1500 - 1800 hours

At 1520 hours, the duty officer (Disaster Services Division) received the first tornado warning message. The duty officer briefed the managing director, who in turn directed the following:

1) that the Edmonton Office be contacted and advised of the situation. (The office then relayed the information to the municipalities indicated.)
2) that Public Affairs be in contact with all broadcasting media to ensure that the warnings are being broadcast.
3) that preparations be made to activate the GEOC.

At 1545 hours, the duty officer received an updated tornado warning and, from the CIC, the first indication that a tornado had touched down at 50th Street and 90th Avenue. The duty officer initiated calls to the Edmonton Field Office and the director of communications to disseminate the information to municipalities and the media. It quickly became evident that the duty officer could not deal with the situation alone, because both he and the CIC were deluged with calls. At 1550 hours, he asked the director of Disaster Health to activate the GEOC and act as the GEOC co-ordination officer. APSS day staff were advised not to leave for home because they might be needed. By 1600 hours, the GEOC had started up and by 1605 hours the recording process had begun.

Within 20 minutes, the centre was fully activated. This entailed:

- a senior operations co-ordinator to direct activities
- an operations officer to answer the telephone
- staff to display information
- staff to call municipalities, medical facilities and government departments
- support staff to provide word processing, telex, facsimile, courier and telephone reception services.

The centre's staff processed incoming calls, plotted damage reports, developed an event situation model, recorded volunteer assistance offers and handled inquiries from municipalities and the public.

In addition, the CIC increased its manning levels to assist in answering phone calls coming in on all available lines. Calls included requests for information, requests for help and offers of assistance. Ordinarily, the APSS public affairs group, supplemented by Public Affairs Bureau staff, handles most public inquiries as well as media inquiries in emergency situations. However, there was difficulty in contacting group members because it was Friday afternoon on a long weekend. Only four were available, but by Saturday morning a full complement was in action.

A second tornado warning was received at 1714 hours and was disseminated as quickly as possible. At 1730, the GEOC co-ordinated the dispatch of St. Albert fire department resources to the Charles Camsell Hospital, which was experiencing flooding problems. The managing director asked liaison officers dispatched to other Emergency Operation Centres (EOCs) to report back on the situation should additional assistance be required.

The biggest problem was trying to put together a complete picture of what was happening and where. Information from radio, television and telephone was alarming but incomplete and impossible to verify because of the overloaded telephone system. A staff member quickly left when he learned that his house had been hit and his wife was inside. Other staff were concerned for their families and homes. The strain was evident. Nevertheless, all available staff remained past normal office hours to help in whatever way they could. By 1800 hours, it was necessary to send people home because there were too many volunteers and a second shift was likely to be needed by midnight.

1800 - 2100 hours

By 1800 hours, APSS liaison officers had arrived at the EOCs of the City of Edmonton and Strathcona County. Each was equipped with an Aurora telephone. As well, APSS Disaster Social Services had contacted various government and municipal social agencies, including Occupational and Community Health and Safety, Mental Health, and the Red Cross, to ensure they were aware of the situation and to check their activities.

The liaison officers were able to send up-to-date information back to the GEOC and answer specific questions.

By 1822 hours, the City of Edmonton had established a public inquiry telephone number and the City Police Victim Services Unit number was identified as the number to call for casualty inquiries. At 1828 hours, the

Mayor declared a Local State of Emergency. By 1933 hours, the County of Strathcona had also established a public inquiry number.

Disaster Health Services was in regular contact with the Edmonton Ambulance Authority and various medical facilities. The Medical Examiner's Office had also been advised. At 1914 hours, Disaster Health Services co-ordinated the request for a Medical Examiner through the Edmonton Ambulance Authority. Parts of a casualty collecting unit were provided from APSS-controlled stocks to the City Police command post at 64th Avenue and 31st Street, and equipment from storage at Alberta Hospital was put into use at Evergreen Mobile Home Park, which had suffered numerous casualties.

At 1940 hours, the GEOC co-ordinated and made available Department of National Defence helicopter resources.

At 1943 hours, a mine rescue team under Greg Smith, Alberta Community and Occupational Health was put on standby, and portable infra-red imaging equipment was made available. The GEOC co-ordinated the dispatch of sacks and blankets to the Edmonton Ambulance Authority command post at 64th Avenue and 31st Street at 2010 hours and referred information to the Department of National Defence about passengers for its helicopters.

The GEOC and CIC continued to receive many calls, particularly from British Columbia where numerous Edmontonians were vacationing.

[redacted] 2100 - 2400 hours

At 2109, the GEOC co-ordinated the requirement to have the Alberta government aircraft transport the chief Medical Examiner from Calgary to Edmonton. The Government Services Air Division, Public Works Supply and Services, provided an aircraft in Calgary at 2245 hours.

GEOC staff continued to process phone queries, update the situation model, and document volunteer resource availability, placing many volunteers on standby until they were required.

At 2120, the Department of National Defence helicopters wound down their activities for the day; at 2134, the Salvation Army called in with volunteers. A call from the Canine Service, Search and Rescue at 2115 hours offering dog rescue teams was referred to the City of Edmonton's command post.

By 2154 hours, APSS staff reported to the GEOC that Bonnie Doon High School was ready to operate as an evacuees reception centre, with 70 evacuees expected. The Municipal District of Sturgeon called at 2225 hours requesting sand bags and equipment, which the GEOC arranged to send.

By 2230 hours, the city manager had discussed matters with the

managing director of APSS. The reeve of the County of Strathcona had called in personally with a report on the extent of damage in that area.

The acting minister visited the GEOC and was briefed on the situation at 2300 hours.

A staff changeover took place at 2400 hours.

[redacted] Saturday, August 1 — 0001 - 0800 hours

Calls continued intermittently throughout the night, the majority of them inquiries about friends and relatives.

[redacted] 0800 - 2200 hours

The same staff who had gone home only eight hours before took over the day shift.

Early in the morning, the GEOC made arrangements with Alberta Government Telephones to pass out-of-province calls on to them to help take the load off the City of Edmonton's Emergency Operations Centre.

General inquiries were received throughout the day. Management of the emergency was firmly in the hands of the municipal authorities. The role of GEOC was to continue monitoring the situation and provide assistance when requested. Elsewhere in the building, planning and preparation for the recovery phase was under way.

At 0834 hours, the River Forecast Centre of Alberta Environment issued a high water and flood warning for Peace River, High Prairie and Slave Lake. As the operations staff and CIC relayed flood warnings, the GEOC started to receive damage reports from municipal officials across the province concerning wind, hail and flood damage.

[redacted] August 2-3

At this point, the operations staff was down to one. All other staff were committed to the recovery phase.

On August 2 and 3, staff concentrated on ensuring that flood warnings were received by the appropriate municipal authorities and requesting their reports if damage occurred.

[redacted] Tuesday, August 4

Municipalities and government departments were back in operation after the long weekend. Damage assessments were requested, and by the afternoon of August 4, the formal operation of the GEOC ceased.

Conclusions

Within APSS, the operation of the GEOC and the PMIR went well. However, there is always room for improvement. The tornado provided a real test of plans and procedures. Apart from some minor adjustments to published procedures, one significant change was made for future incidents. This involves the location of the PMIR. The media information room was originally located on the top floor of the APSS building. Because of this, it was necessary to have a public affairs representative in the GEOC to monitor information and relay it to the PMIR staff for accurate and prompt dispatch to the media and public.

In future, the PMIR will be located on the same floor as the GEOC and the CIC. Additional telephone lines have been installed and will be activated within minutes by a call from the duty officer to 'edmonton telephones'.

An old lesson re-emphasized was the tremendous benefit derived from sending a liaison officer equipped with a mobile or Aurora telephone to the emergency sites. The liaison officer can keep the GEOC fully informed and relay requests for assistance directly. Those who are engaged in response operations are often too busy to relay regular activity reports.

Reviews of the tornado and associated activities made internally and by other agencies indicated a number of areas where improvements could be made.

APSS is working with Environment Canada's Atmospheric Environment Service and the broadcast media to improve the understanding and dissemination of both weather and other emergency warning information. Another joint project is to improve public awareness of weather warnings and appropriate actions to be taken. (See article on the Weather Warning System by Alton F. Wallace.)

Two longer-term projects relate to emergencies or disasters. In one, a joint provincial/federal group is working on a "line-load control" system for the telephone network. The purpose of such a system would be to protect previously identified key telephone numbers essential to the management of an emergency situation. The tornado emergency brought out a number of observations concerning overload of the telephone system causing delays in relaying important information.

A second study is under way with provincial government departments and municipal representation to determine the feasibility of a province-wide 911 emergency telephone reporting system. The obvious advantage would be that only one number would be needed for emergency reporting wherever the caller may be.

City of Edmonton, Emergency Operations Centre

This report was prepared from an interview with Bruce Wilson, the City of Edmonton's emergency planning officer, and from a report provided by the City of Edmonton Police Department.

The City of Edmonton has an active Emergency Planning Committee that meets monthly. Chaired by the city's emergency planning officer, this committee consists of all civic department heads or their delegates and operates under the provisions of the Edmonton Peacetime Emergency Plan. Emergency exercises are held frequently. Examples have included a table-top exercise dealing with a major chemical spill and an exercise dealing with a major air crash at the Edmonton International Airport. Smaller exercises have tested the effectiveness of local hospital emergency plans.

The Emergency Planning Committee maintains a close liaison with Alberta Public Safety Services (APSS), Alberta Community and Occupational Health, Northwestern Utilities, Strathcona Mutual Assistance Group and similar agencies in and around Edmonton. Representatives from these groups attend the committee's meetings.

At 1540 hours on the afternoon of July 31, 1987, the executive administrator and secretary of the Executive Committee of Council learned that APSS had notified the Emergency Planning Office of a severe weather warning for the Edmonton area. He also discovered that some telephone systems had already been knocked out.

He went to the room in City Hall that is equipped to accommodate the Emergency Operations Centre (EOC) and immediately activated the "ring down tie line". This connected the telephones directly to department headquarters, and all department heads were notified to report to the EOC. By this time extra police and fire resources were already dispatched to the southeast portion of the city in response to reports of storm-related damage.

The room was soon filled with senior representatives from all departments and agencies, including Disaster Services, Police, Fire, Transportation, Telephones, Water and Sanitation, Power, Ambulance Authority, Corporate Communications, Health, Social Services, Northwestern Utilities, Alberta Community and Occupational Health, APSS and Edmonton Emergency Planning Office. The mayor, his executive assistant and two aldermen were also present.

Having the major decision-makers at the EOC, where they had access to all current information and contact with department heads, was an important element in managing this crisis and expedited operational activities.

The Police Department's emergency suitcase radio was plugged in and the two direct lines to Police Communications Division were tested along with the outside line provided. Co-ordination of police activities began. At the outset all attention was concentrated on Millwoods and the southeast industrial area where the tornado first struck.

The first requests to the EOC were for personnel from Edmonton Power

and Northwestern Utilities to turn off power and gas. Fourteen massive power transmission towers had been destroyed and high tension lines littered the area. The smell of natural gas was reported throughout the entire industrial district. Power was promptly shut off. Gas was closed off after some minor problems were encountered in locating an appropriate map.

Approximately 30 minutes into this operation, a broadcast was made over police radio channel 2 that a number of deaths had occurred at the Evergreen Mobile Home Park in the city's northeast. This second emergency site operated on police radio channel 4, making it difficult for the EOC to closely monitor both situations simultaneously. The problem was resolved to some degree by notifying police incident commanders at both sites of the dedicated police telephone numbers at the EOC. By this time both commanders had access to telephones at their sites. All requests for equipment and other resources were handled over these lines.

An occurrence log was maintained of all items requested and dispatched by the EOC and of verification that they had been received on site. Items included mobile cranes, caterpillar tractors, front-end loaders, backhoes, single-axle and tandem trucks, barricades, storage and accommodation trailers, portable toilets, buses and bolt cutters. Requests were given verbally to the city engineer for transportation. Items were then dispatched to the emergency site, where they were met and directed by the police. Other issues, including food and rest areas for search and rescue workers and volunteers, were also organized through the EOC.

Throughout the evening and into the early morning, the EOC provided the essential link between the groups, departments and agencies involved.

Police messages regarding dangerous goods spills and radioactive materials were passed to the APSS representative, who arranged for the response of trained personnel.

Edmonton Social Services set up an office next to the EOC and made arrangements to handle inquiries from friends and relatives of victims and missing persons.

At 1812 hours, the mayor declared a state of emergency. As all utility services had been shut off at the Evergreen Mobile Home Park, the Evergreen police incident commander evacuated the entire park, or approximately 1,700 persons. Social Services immediately set up a reception centre in the Bonnie Doon Composite High School and arranged for overnight accommodation for displaced persons at the Sunset Lodge and the Single Men's Hostel.

Police complaint lines were inundated with calls from relatives and friends of persons living in or visiting the Evergreen Mobile Home Park. The Victim Services Unit operated the first organized response to this

demand for information. Shortly after, the Canadian Red Cross set up an organized inquiry centre providing updated information throughout the operation.

An Emergency Procedures Information Centre was also established at City Hall, close to the EOC. This centre was staffed by members of the Citizen's Action Centre and City Hall clerical staff and, at times, by a city council alderman. It operated 24 hours a day from the afternoon of July 31 until late August 2 and re-opened on the next (Monday) morning. The centre handled requests for information from around the world.

At the height of activity, the mayor, city manager, police chief and fire chief held a meeting to discuss the feasibility of officially requesting "Aid to the Civil Power" from the military. There was no evidence to suggest that the city emergency response personnel were not able to handle effectively the situation. Indeed, by 2019 hours, two firehalls in Millwoods were back to normal service and the police were politely declining offers of assistance from hundreds of volunteers.

Volunteer fire departments from smaller communities near Edmonton arrived at the emergency sites with needed equipment, including generators and emergency lighting. Additional power plants and lights were dispatched from the City Yards as darkness approached.

As emergency sites were stabilized, arrangements were made through the EOC to secure the damaged areas to prevent looting. Evergreen ordered 30 security guards to relieve police personnel who had been working for 16 hours.

Arrangements were made through EOC for Evergreen to clear an area large enough for three helicopters to land. The mayor and other senior officials flew over the path of the tornado, then landed at Evergreen to inspect the damage and encourage those engaged in search and rescue, security and other duties.

Throughout the emergency phase of this event, only one request received at the EOC could not be supplied. The police incident commander in the devastated commercial area east of 34th Street requested building plans to facilitate searches of large industrial complexes. These plans were unavailable.

Police personnel manned the EOC until 0100 hours, August 1, at which time further requests for equipment or assistance were directed to police radio control at police headquarters.

At 0800 hours on August 1, the mayor held a detailed debriefing of all department heads or delegates after which the media were invited in to question all present. A status report of the effect of the tornado on each service and utility was provided. At this time search and rescue on the southside was almost complete and the area was secured. Search and rescue was still underway at Evergreen.

Throughout the day, liaison was conducted between the Mayor's Office, the Police Department and many other agencies with regard to names and addresses of deceased and injured persons; inquiries from around the world; equipment and other material needs; briefing for government officials; complaints from and assistance to evacuated persons; briefings for the police chief and deputy chief; and other tasks.

Arrangements were made for official inspections of both emergency sites by politicians and other government officials who would be involved in the cost sharing of expenses resulting from the tornado.

Strathcona County, Emergency Operations Centre

The tornado touched down on Strathcona County's industrial area, killing seven people, causing hundreds of injuries and resulting in $250 million property damage.

As the tornado approached the heart of the industrial area, a paramedic aboard a Strathcona County ambulance stopped on the freeway and notified the Fire Department dispatcher of the situation via radio. This allowed Strathcona County emergency services (fire, ambulance, RCMP) to respond immediately and provided an opportunity for emergency operations headquarters to be established within 15 minutes of touchdown.

Prior warnings of a potential tornado were either nonexistent or treated with little regard.

The tornado touched down at 1535 hours. By 1550 hours, the director of disaster services had been advised of the strike, had monitored radio communication between ambulance and fire apparatus on site and had requested staff to come immediately with required personnel to the Emergency Operations Centre (EOC) located at the county administration building in Sherwood Park as specified in the Strathcona County Emergency Plan.

The following designated personnel arrived at EOC at 1600 hours as part of standard procedures in the county disaster plan:

Commissioner/Director, Disaster Services – responsible for implementing all or part of the disaster plan and advising Council and Alberta Public Safety Services of actions taken.

General Manager, Corporate Services – responsible for ensuring adequate financial and activity records are kept of emergencies.

RCMP Inspector – co-ordinates the establishment of field headquarters, supplementary communications, emergency vehicle route; responsible for protection of life and property, crowd control, traffic control, criminal investigation, evacuation and casualty identification.

Deputy Fire Chief – reported to EOC because fire chief was unavailable; responsible for co-ordinating rescue and firefighting, communications, notification of hospitals, mutual aid participants, emergency medical services, and for assisting in evacuations and establishment of field headquarters.

General Manager, Transportation and Utilities – co-ordinates inspection and report of damaged buildings, procurement of heavy and light equipment, supplementary communications, provision of barricades and temporary signs, emergency water supply and sanitation, utility hazard elimination and supplementary manpower.

Facilities Co-ordinator – co-ordinates requests for use of county facilities including schools; responds to need for electricians, plumbers, carpenters, structural repairmen, painters, heating and ventilation workers.

Project Assistant, Commissioner's Office – provides assistance to director of disaster services through involvement in preparation of disaster plan, research, and being available during an emergency incident.

Manager, Family and Community Services – responsible for co-ordination of registration and inquiry, emergency lodging, feeding, clothing and personal services at emergency reception centres.

Public Information Officer – co-ordinates the release of information to the public and assists in keeping staff and other groups informed of developments.

Manager, Recreation and Parks - assists in making available facilities for reception centres, temporary morgues.

Manager, Transportation - responsible for providing additional vehicles for transportation of injured, provides transportation for schools, libraries, senior citizens' homes, nursing homes and the public in event of emergency.

During the next three hours the EOC provided assistance and direction to the site command post, operations co-ordinator and deputy fire chief and contacted other municipalities to implement mutual aid agreements.

The following major concerns arose:

1) There were reports that another, similar storm front was approaching Strathcona.
2) There was a sketchy report of a major train derailment in an isolated area involving toxic and flammable substances. This suggested that evacuation of the area might be in order.
3) Several injured people had started walking through the disaster area. Great amounts of debris, dangerous goods, live power lines and leaking gas caused concern for their safety.
4) Debris, demolished vehicles and traffic congested all normal routes for emergency vehicles to the site.

Between 1600 and 1630 hours, members of the EOC continued to monitor police, fire and ambulance activities and received increasingly alarming information about the magnitude of the disaster.

Reports were received that there had been a train derailment in a more remote industrial area. A decision was made to ready the Ardrossan

Recreation Centre as a possible reception centre in case evacuation became necessary. A secondary reception centre at Josephburg was on standby.

Widespread damage, including devastation throughout Strathcona's industrial area, was reported. The storm appeared to be moving toward major petrochemical locations.

By 1630 hours, all telephone communication between county departments and between the county and the outside world ceased to operate effectively due to an overload by users inquiring about the situation.

Atmospheric Environment Centre reported another storm and possible tornadoes were expected. The City of Edmonton was contacted to provide ambulance assistance and the county received a commitment from Edmonton's mayor for all possible assistance. Offers were also received from other neighboring municipalities.

At 1640 hours, a bulletin was issued via the regional teleprinter advising that a tornado had hit western portions of the county with severe property damage and some injury. Emergency crews were responding.

The director of disaster services recommended to the deputy reeve that a state of emergency be declared. A state of local emergency was declared by Strathcona County at 1650 hours.

During the next 20 minutes, assessments were received of the train derailment and hazardous materials release and possible need for evacuation. Ammonia and butane gas were leaking. Liquified gas was involved as well, but it was not possible to determine how much at this stage. The Edmonton Fire Department was requested to respond because all county emergency equipment was deployed and access for police was restricted by road blockages.

RCMP reported that the area west of Sherwood Park between Baseline Road and Sherwood Park Freeway and east of 17th Street was sealed off. The Fire Department reported 150 injuries and two fatalities between 17th and 34th Streets. TransAlta Utilities reported that five lines were down and substations to Sherwood Park were damaged. Power lines were lying across the freeway. All volunteer firefighters (100) were requested to stand by.

Reports were received of substantial damage to Canada Packers, Byers Transport, Shaw Pipe and Everall Construction.

A second bulletin to residents advised that a state of local emergency had been declared and that there had been two confirmed casualties and 150 injured. Police and fire crews began a door-to-door search for further casualties. The public was advised to stay indoors.

At 1736 hours, Canada Packers requested assistance in evacuating up to 250 employees. The facility received severe damage, and reports of another storm coming caused concern for employees' safety. Strathcona County Transportation Department was directed to evacuate the workers.

RCMP tried to clear the freeway for the buses, but debris slowed the buses down. Canada Packers workers walked to 34th Street and the freeway, where they were picked up and taken to Sherwood Park Mall. They stayed there until the roads were cleared and were then bused into Edmonton.

Meanwhile the derailment situation was looking serious. Eight ammonia tankers and four empty cars had derailed. It was felt the tankers might explode. The disaster services director notified Petro Canada to evacuate the area. Within minutes, the wind had shifted and the evacuation was no longer necessary.

Sherwood Park Freeway and Baseline Road were re-opened at 1844 hours and as many vehicles as possible were allowed through. Traffic congestion was a major problem.

At 1858 hours, the regional tornado alert was lifted. A total of three persons had been reported dead.

Facility crew members were sent to assist in making structural assessment of damaged buildings. Command headquarters was to remain open pending search and rescue functions. The RCMP detachment desk was to record search and rescue information.

At 1930 hours, plans were made for the reeve, disaster services director and other key personnel to tour the disaster area and determine steps for a search and rescue of damaged buildings. The search was concentrated in the Sherwood Park industrial area. Four were confirmed dead.

At 2105 hours, the Fire Department reported that seven were confirmed dead. During the night and up to 0600 hours, August 1, files were researched and detailed maps prepared to assist search and rescue crews seeking dead and injured, dangerous goods and structural hazards. In the search for records of potential dangerous goods or explosive material that may have been stored in the damaged premises, existing information proved inadequate.

The RCMP established an Emergency Rescue Team command post and began a search and rescue effort at 0600 hours on August 1.

Premier Don Getty, his wife, the acting minister of environment and Alberta Public Safety Services (APSS) staff arrived at the disaster site at 1000 hours. The premier pledged to reimburse all costs incurred by municipalities in the search, rescue and clean-up operation. This visit provided the Strathcona director of disaster services with an opportunity to become more familiar with the role of APSS. Prior to the tornado, the municipal understanding of the role of APSS was unclear.

On August 2 and 3, county staff and elected officials contacted all businesses in the secured zone to advise them of the status of the clean-up effort and to provide information on the disaster assistance centre to assure them that what was left of their property was being properly safeguarded.

Problem areas

Following the disaster, several administrative problems emerged:

1) Regardless of the premier's promise that all costs would be covered by the province, most agencies continued to express concerns about costs and deployment of resources.
2) Now that the tornado had become an international story, literally hundreds of individuals and agencies wanted to take credit for their role and authority in dealing with the disaster.
3) Sightseers from throughout the region and farther afield attempted to enter the disaster area, hindering search, rescue and clean-up efforts.
4) Detailed maps of the area and plans of damaged buildings were not readily available.
5) Since the incident took place on a holiday weekend, there was some difficulty in contacting businesses and obtaining resources necessary for the search and rescue operation.

RCMP held responsibility for search and rescue and perimeter security. Strathcona County was unable to hire security agencies and requested assistance from the Canadian militia to work with the local RCMP detachment for perimeter control until all businesses were able to re-enter and occupy their premises. The local militia was very obliging and agreed to have units on site by noon August 4. The Canadian Armed Forces then indicated a desire to become part of the operation rather than the militia. Discussions deteriorated and a decision was made by the director of disaster services to cancel all requests for assistance from either the militia or the armed forces and requested the local RCMP continue perimeter security until noon on August 7.

Victim assistance centre

A conference was held at 1600 hours, August 1, at the offices of Alberta Public Safety Services to confirm the status of the disaster situation and establish co-operation between Edmonton and Strathcona County in the approach to public relations information and the management of the post-disaster situation. It was agreed that two assistance centres be established: one in Edmonton to deal with persons who had experienced loss of personal property and one in Strathcona County to deal with all business and industry matters. (See separate report in Section 7 on Victim Assistance Centres.)

Followup and suggested revisions to disaster plan

On August 12, a debriefing of all county departments was held and the following areas were identified as needing review or revision:

1) Communications/media relations – Improved and alternate methods of getting messages to the media and the public were explored. Additional staff are being trained to handle switchboard and telephone inquiries during an emergency. A media luncheon, hosted by the county, has been held to request media input on how the municipality could better provide documented communication during emergency incidents.
2) Work is proceeding on improving the readily available supply of detailed maps of industrial areas and businesses.
3) Radio/telephone communication – Volume and congestion of calls hampered communication. A number of cellular phones have been purchased with battery packs to be stored in disaster headquarters. A new radio system has been ordered by the Emergency Services Department.
4) Information on businesses – The fire chief is working with businesses to improve relations and identify key personnel and phone numbers for after-hours contact to advise of extent of damage or acquire necessary support, equipment or supplies.
5) Methods of evacuation are being reviewed.
6) Location of Emergency Operations Control (2nd floor, corner with windows) was inappropriate during the tornado.

Conclusion

The industrial area is being reconstructed through insurance funds and federal and provincial assistance. The municipality has taken several steps to improve its disaster plan for future incidents. The public at large has become much more aware of the possibility of a recurrence. Through use of internal and professional assistance, the county continues to deal with the emotional condition of personnel directly involved in the reponse to the incident.

Although tremendous destruction, death and injury occurred, Strathcona County considers itself fortunate in that it had a plan to deal with the situation; it had capable, competent fire, ambulance and police departments; and personnel had taken part in tabletop exercises and simulated field exercises to assure themselves that the plan would work.

Site Reports: Police, Fire and Rescue Teams

3

City of Edmonton, Police Department

This is a summary of several reports prepared by the City of Edmonton Police Department.

When the tornado struck, the Edmonton Police Department assumed major responsibilities for immediate response, co-ordination, search and rescue, communications, security, evacuation and other essential tasks at the emergency sites. In addition, the department played a major role in establishing and running the Emergency Operations Centre (EOC) in City Hall.

EOC responsibilities

The police chief and a constable from the Communications Division reported to the EOC when the centre was activated, bringing with them an emergency suitcase radio. Direct lines to the police Communications Division were established and the co-ordination of police activities from the centre was begun. Contact with police incident commanders at both emergency sites was maintained via dedicated police telephone numbers at the EOC.

Police handled requests for equipment from the emergency sites and relayed messages regarding dangerous goods to Alberta Public Safety Services. The department's Victim Services Unit operated the first organized response to calls from relatives and friends of persons living in the affected areas.

In addition to other tasks, the police representative at the EOC ensured that sufficient trained police were available to deal with immediate needs at the sites. Personnel working day shift were retained beyond their regular working hours. Other personnel were called in early and the department's emergency mobilization plan was implemented to call in personnel who were on regular days off. At no time were police resources completely expended, although regular police response was limited to priority calls throughout the emergency phase.

Police personnel manned the EOC until 0100 hours on August 1, when police incident commanders were advised to direct further requests for assistance to police radio control at police headquarters. (Also see report on City of Edmonton, Emergency Operations Centre, in Section 3.)

Southeast emergency site

Response

The tornado entered Edmonton's southeast area at 1535 hours.

A short time later, police communications began to receive calls of downed power lines, flooding, intrusion alarms, wind damage and other incidents normally related to a heavy summer storm. The superintendent at "C" Division station directed that all available personnel respond to the

affected area. A constable was dispatched to assist at a complaint of live, downed power lines at 30th Street and 64th Avenue. When he arrived on the scene, he saw trees and pieces of siding hanging over the power lines and immediately called for power linemen to respond. The sergeant in charge of organized response immediately requested that all power be shut off east of 34th Street, and within 30 minutes he ordered Northwestern Utilities to shut off all gas to the area.

All available personnel from "C" Division were sent to the emergency site. Communications Division determined that "C" Division required additional assistance and dispatched a sergeant and six constables from "A" Division. In all, 102 police officers responded to this area and participated in search and rescue, first aid, site control and security duties.

The "C" Division superintendent was police site commander, while the "A" Division inspector was assigned duties as field commander in charge of search and rescue teams.

Immediately upon arriving at the site, the site commander established a command post from which he controlled and co-ordinated all activities on site. The Mobile Command Post was taken to the area and kept there until approximately 0400 hours, when it was removed to the second emergency site at Evergreen Mobile Home Park.

A constable was appointed diarist and the Police Department's public information officer was summoned to the scene. Traffic control and security points were established promptly to maintain easy access for emergency vehicles and heavy equipment.

A method was developed to conduct a thorough and systematic search of all buildings, equipment, vehicles and lands in the affected area and a record was kept of all buildings searched and cleared. Agency personnel and volunteers responding to the police command post were recorded, organized and directed to various tasks.

The site commander contacted the Emergency Operations Centre (EOC) for all equipment needs including telephones, portable generators, portable toilets, maps, building plans, heavy equipment, food for emergency workers, and other items.

By 1600 hours on August 1, the site was stabilized.

Throughout all phases of the emergency operations, there was never any confusion in terms of authority. Firefighters and all other agency personnel looked to the police for leadership. No leadership conflict existed at any time, a factor which was instrumental in what became a very efficient and effective emergency response.

Search and rescue

Search and rescue was started by individual police personnel who first arrived at the scene at approximately 1600 hours and was completed approximately 24 hours later.

Shortly after the emergency began, a field commander in charge of search and rescue was assigned. His objectives were to:

- locate dead and injured persons
- expedite medical attention
- identify building owners to account for employees and customers
- search the outer perimeter
- search all damaged buildings
- search all outlying property in the affected area

The field commander organized search and rescue teams of police and fire personnel and volunteers and set up an efficient search management system.

Search and rescue located managers from all businesses in the area and obtained employee lists from them. Names were gradually eliminated as people were located and the injured and dead identified.

Search experts were brought in, including John Bauman and mine rescue teams from Hinton, Edson and Fort McMurray. (See separate reports in this section by John Bauman and by Greg Smith, Mine Rescue Co-ordinator, Alberta Community and Occupational Health.) Earthquake Preparedness and Rescue of California also responded.

The teams found many injured persons and transported them to emergency medical facilities and to ambulances. Stretchers were in short supply and searchers improvised with sheets of 3/4-inch plywood scattered over the area. Due to debris preventing vehicle access, six men had to carry one 300-pound male a distance of four blocks.

Searchers experienced the most difficulty in the area of Nault Lumber. The concrete roof of the premises, weighing 300 tons, had been lifted and carried 25 metres (82 feet north). The ground was covered with large slabs of the roof interspersed with 10 collapsed cement girders 75 feet long and 4 feet wide, each weighing 30 tons. Eventually rescue workers found they could knock holes through these girders with a sledgehammer to look beneath the rubble. One body was discovered using this method.

As bodies were discovered in the rubble, Police Venturers (cadets) were posted to guard them until the bodies could be removed by the medical examiner. In all, five bodies were found, the last one by a police service dog.

There is no question that other agencies and volunteers looked to the police for leadership in this search and rescue effort.

Security

Security and access control was a concern from the time of police arrival at the site. Initial control points were determined and police personnel assigned to key access roads to eliminate unnecessary traffic and expedite movement of emergency vehicles.

When search and rescue was completed, a standard operational plan was developed to protect life and property, restore public order, provide a visible presence and to restrict site access to people with legitimate reasons for being there, i.e. residents, insurance adjusters, clean-up personnel, etc.

Written records were maintained of all persons and vehicles entering and leaving the site. Security was provided continually until August 10 when conditions had returned to normal. Only one incident of looting was reported.

Because of the very large area affected, the outer perimeter was not totally secured. Major concern was with vehicular traffic. However, some sightseers parked their vehicles and entered on foot, thereby avoiding vehicular controls. Although mobile police patrols were present, the lack of an accreditation system resulted in diminished on-site security.

Evergreen emergency site response

The tornado struck the Evergreen Mobile Home Park at 1553 hours. The storm immediately destroyed the park telephone system, effectively removing the key means of summoning help.

The first response of residents was to search for friends and relatives and to care for the injured. Shortly, they realized that someone had to notify authorities so that medical and emergency assistance could be dispatched. A group walked about two kilometres or 1.3 miles to the Alberta Hospital, Edmonton. Another person drove to the "B" Division Londonderry police station. Up to this time all police attention had been focused on the south side of the city and police resources had already been directed there from "A" and "D" divisions.

Meanwhile, Alberta Hospital implemented its emergency (mobilization) plan. The hospital's fire department went to Evergreen, where they found many injured persons covered in blood walking toward the entrance. The tornado had dropped a lot of rain as it passed through and in some places the water was more than 1.5 metres/5 feet deep.

The fire chief radioed the hospital switchboard to contact city fire and police departments and other key emergency agencies.

Access roads through the park were almost impossible to locate due to deep water and debris. Gas leaks abounded and the smell of hydrogen sulphide was in the air. A small fire was burning. A pumper truck was dispatched to put out the fire before an explosion could occur.

Meanwhile, at Londonderry station police had heard residents reporting

the tornado on a radio talk-back show. The phone call from Alberta Hospital coincided with the arrival of a survivor from Evergreen. Personnel took whatever transportation was available and headed for Evergreen.

At 1612 hours, 19 minutes after the tornado struck, the first police response unit was dispatched to Evergreen. All available personnel were dispatched to the site and many off-duty members arrived ready for assignment. By 1630 hours a control point was established and there were enough police at Evergreen to handle police functions for this type of disaster.

Once the extent of the disaster was known, a second control point was established at Londonderry station. This centre initiated the call-out of all off-duty personnel including those on vacation, contacted Victim Services Unit for assistance, called in the Community Police Radio Network and used the media to recruit volunteers.

Because of debris, many emergency response people found it impossible to get into Evergreen via the main entrance, so they abandoned their vehicles. A serious traffic problem developed and tow trucks were called in. Many responding policemen were assigned to traffic control, point duty and security duties, while others entered the site on foot. One was asked to take an injured baby to hospital, since most ambulances had already been dispatched to the emergency site on the south side. Due to flooded underpasses and traffic congestion, the journey took about 30 minutes. However, the officer was able to identify an open route for emergency vehicles to the major hospitals and transmitted that information to communications and emergency site command.

Because of the scarcity of ambulances, police had to commandeer civilian vehicles to take the injured for medical attention. A 4 x 4 truck and an old school bus were also used. The first police personnel on site organized traffic control and security and assigned police teams to search the affected area. They were preceeded to the site by Fire Department personnel, who were also assigned to search teams. Walking wounded were directed to buses waiting at the entrance to take them to hospital. The seriously injured were carried out. Some were taken to hospital by ambulance and some by helicopter.

Command

The police site commander, an inspector, arrived in an unmarked "K" car and immediately appointed a diarist and a radio operator. Site command was exercised from his vehicle until the Homicide Unit station wagon, equipped with a mobile telephone, was requested and delivered. Other operational divisions were canvassed for personnel, vehicles and radios. A request to EOC resulted in five additional telephone lines being

installed in Londonderry station. At 0400 hours, August 1, the Police Mobile Command Post was taken from the south side to Evergreen and remained in operation there until 1600 hours on August 10.

After the mayor declared a state of emergency and all utilities had been shut off in the area, police decided to evacuate the entire mobile home park. The Transportation Department supplied buses for the evacuees and also transported policemen and volunteers from Londonderry station to Evergreen. By 1900 hours, 27 mobile units containing 40 policemen were deployed in and around the park. Barricades were placed at key intersections to relieve police for more pressing duties.

At 1915 hours, flooding in the underpasses on major traffic arteries leading to downtown was clearing and police assigned to these areas were redirected to Evergreen to help control sightseers. Volunteers helped police to conduct foot patrols to deter looters.

All emergency response agencies at Evergreen co-operated fully and no conflict existed at any time. Each agency seemed to believe that it had individual responsibilities. No one person emerged as overall site manager in spite of the fact that the Edmonton Peacetime Emergency Plan clearly states that the senior police officer present is in charge of the emergency site. Due to prevailing conditions, it was very difficult to call together the senior personnel from all responding agencies to consult on a co-ordinated action plan. Consequently, operations were haphazard, with search teams forming and reforming and duplicating efforts.

While the site commander was fully occupied with on-site emergency management, a superintendent at Londonderry station ensured that personnel and equipment needs were attended to. Due to the volume of radio and telephone traffic, communications between the two command areas were not always completed or understood. As a result, divergent views developed on some key issues concerning site access controls and deployment of police personnel. Both officers used the EOC to request major equipment and resources. Other items were ordered independently of the EOC and police executive officers. This resulted in an overabundance of expensive heavy equipment that was in many cases not used.

The security system (described below) developed by the site commander is an example of how well a police-operated outer and inner perimeter can work. The commander also had a property control system set up to deal with valuable personal items found on site. An effective reception centre for injured persons and a temporary morgue were quickly established in the small commercial centre just inside the main entrance to the park. A police information officer was called in and space was allocated for the victim advocates of the Victim Services Unit and for an SPCA representative to deal with injured pets.

By 1230 hours on August 1, all injured persons had been treated and the bodies of all deceased (15) were under the control of the Medical Examiner's Office.

Utilities service was reconnected to almost all mobile homes by late evening, August 2. By 2300 hours, 70 percent of evacuated residents had returned, assisting in securing this area. They became an instant Neighborhood Watch, reporting all strangers and unusual events to the police.

Members of task force section assigned to the Mobile Command Post maintained a color-coded map of the entire mobile home park that provided an accurate situation report on the condition of every mobile home and whether or not it was occupied. The map was an invaluable aid throughout police operations. These members also recorded the issuance of emergency equipment and items of clothing, and co-ordinated, recorded and maintained all information on residents visiting the affected area. These records were instrumental in locating and interviewing all residents of the site.

Search and rescue

The first policemen to enter Evergreen either searched alongside the firemen or searched independently. Many had no portable radio and were unable to contact a supervisor or respond to a command. This random search went on for almost an hour before some organization was imposed.

Many of the police engaged in the search did not know who was in charge of the operation and received no specific directions during their first few hours of duty. It was clear to most that the firemen were doing most of the searching and the police were "assisting". There was much duplication of effort as trailers were searched and re-searched.

The site commander eventually obtained maps of the park showing the location and number of every trailer. Members were then paired up and instructed to search specific sections. At 1900 hours all police search teams were recalled and new teams composed of one policeman and two firemen each were organized.

The first bodies discovered were taken to the medical reception area, an unoccupied store. It was soon realized that it was not appropriate to have the dead sharing space with the injured. The bodies were then removed to a pizza restaurant, just south of the medical reception area, which became a temporary morgue. An ex-member of Identification Section supervised this function.

Up to this point, no thought had been given to leaving the bodies "in situ" until they could be photographed and viewed by the medical examiner. There were 10 bodies in the morgue and rumors of at least 25 to come. A constable was immediately assigned to document descriptions of all bodies

and circumstances under which they were found. Constables photographed and fingerprinted all bodies and went to the location where each had been found to photograph the scene.

Two other constables were dispatched with body recovery teams to photograph the death sites and the deceased. Each body was tagged with a number. A thumbprint of the deceased was placed on the tag and a further photograph was taken of the body with the tag clearly attached.

This temporary morgue processed 13 bodies, the last found at 0230 hours on August 1.

To facilitate the search operation, the deputy fire chief and the site commander agreed to clear a space in the most severely damaged area of the park with bulldozers and front-end loaders. This wreckage was taken off site and secured by police. Damaged trailers would then be lifted from the closest affected area and placed on the cleared area, permitting a more thorough search. This process would be repeated until the area could be declared completely cleared.

The site commander was never really satisfied that this was a proper method of search and rescue. It continued until approximately 1700 hours on August 1, when the commander ordered this operation stopped. What had been implemented as "search and rescue" had turned into "seek and destroy". From this point on no further damage was done to any trailer or item of property while the emergency site was under police control.

With the assistance of the mobile home park manager, the police concluded by 1600 hours on August 1 that all bodies and survivors were found. For the next 10 days, great care was taken to inspect the site daily and supervise the lifting of large pieces of debris to help residents search for personal possessions.

Security

Due to the extent of the damage, valuable personal property ranging from appliances to firearms, jewellery and money was scattered throughout the area.

Two checkpoints were established near the park. Only those persons with valid reasons to enter Evergreen were permitted past the first checkpoint. At the second, persons seeking entry were identified and provided with accreditation. Visitors to the unaffected area of the park were escorted to and from their destination. Visitors to the affected area were provided with forms to be completed detailing all items taken from the site.

A third checkpoint was established at the main entrance to Evergreen. All vehicles, equipment and persons entering and leaving the site were recorded. At any time it was possible to determine exactly who was on site and for what purpose.

The inner perimeter was established by use of barricades, police personnel, private security personnel and roving mobile and foot patrols. Strict security was maintained, and throughout 10 days of operation only one incident of looting was discovered.

To facilitate return of residents to the unaffected area of the park, temporary entrance and exit roads were constructed so that visitors could come and go without entering the inner perimeter.

During the first three days of operations, it was decreed that no resident, media person, insurance adjuster or any other official would be permitted into the emergency site unless escorted by a police officer. Residents wishing to visit their homes were required to report to a checkpoint where they would be identified, accredited and taken by bus to their trailer site accompanied by both a police officer and a victim advocate volunteer. No vehicles were permitted on site. This procedure resulted in many delays and many complaints were received.

After consultation with the chief of police and deputy chief, operations bureau, it was decided this system was counterproductive and that the police role was to encourage residents to visit the site to collect as many of their belongings as possible. If any error was to be made it would be on the side of service to the victims.

On August 3, a press release was issued inviting all residents of the affected area to return to their trailer sites with their vehicles between 0700 and 1900 hours until August 9 to locate and remove their personal property. Heavy equipment, co-ordinated by Victim Services Unit, would assist them, and men from the Christian Disaster Relief would be present to help them.

The accreditation of residents assisted greatly in enabling investigators to contact the resident of every mobile home in the area. This procedure also provided all residents with a number of opportunities to enter the emergency site and claim their property.

A property control unit was set up in a rented trailer for all articles found and turned over to police.

At 1100 hours on August 10, representatives of all involved principals and agencies met and agreed that effective 1600 hours, the police would withdraw all special services and return control of Evergreen Mobile Home Park to the owners.

City of Edmonton, Fire Department

There was some initial confusion when the incident started. We had no idea of the extent of the damage until the first rigs arrived at the various locations and reported their findings.

As the extent of damage became more apparent, it was decided that a general call-out of personnel was required, which was done through the media and by the Communications Branch at approximately 1540 hours.

There was an enormous demand for manpower for search and rescue. During the peak hours of the operations, the on-duty strength of the department swelled from its normal 173 men to 396. The situation was generally stabilized by about 2030 hours and the manpower demands were gradually reduced. By about 0200 hours, August 1, the operation was being conducted with only 45 extra men.

The Communications Branch had to handle 77 separate incidents between 1530 and 2400 hours on Friday. This involved the deployment of more than 190 men and up to 30 pieces of apparatus at some times. The five radio channels available were severely taxed but the dispatch personnel still managed to handle all the activity.

The situation was aggravated by the unstable weather conditions that were causing water blockages of underpasses, downed power poles, and power outages that disrupted street lighting and traffic lights at key intersections.

In the Millwoods/southeast industrial area, crews rescued 15-20 victims from collapsed buildings and damaged vehicles. Twelve to 15 people were treated by the Fire Department for serious injuries.

In the Clareview area, one man and two women were rescued and sent to hospital in civilian vehicles. Natural gas leaks were stabilized by the insertion of wooden dowels where applicable and by shutting off various valves.

The Evergreen Mobile Home Park sustained a two-block-wide path of destruction that destroyed 170 mobile homes, killed 15 people and injured many more. Throughout the rest of Friday night and on into the following day, this department conducted search and rescue operations, treated injured residents, and assisted in the recovery and removal of bodies.

The Edmonton Fire Department's dangerous goods response team was required at 12 separate incidents from 1500 hours, July 31, through August 5, nine of them during the first 24 hours. There were numerous calls about leaking cylinders of propane and other products and also suspected dangerous goods spills including the possibility of radioactive material. The team was instrumental in the prevention of further deaths and property damage. The actions of this team during the disaster should more than justify this department's investment in the year and a half of training the officers of the team underwent.

Critique

A critique was held at the Edmonton Fire Department Training School one week after the event. The following are some of the problems that surfaced and suggestions that were made. (These are in addition to problems already mentioned above.) The Fire Department has since addressed and implemented solutions to these problems.

- Radio traffic was a major problem — five channels were being used. Contact was lost completely at one point between downtown and the south side, even on the designated channel.
- Initially there was little security at the Evergreen site. Too many people were going in and out and there was no system for registering them, and there should have been a better way of identifying and registering the injured and missing.
- Every man should have an emergency light, such as a flashlight — possibly a helmet-mounted flashlight.
- In search and rescue, some groups were covering areas that had already been searched. Suggestion: that every pumper carry colored tape to mark areas already searched.
- There should be a photocopier on the command vehicle.
- The department should look at purchasing more Simplex radios, since no problems were encountered with Simplex radios on site. It was suggested that a loud hailer on site would have helped the situation as well as extra radios.

RCMP, Sherwood Park Industrial Area

The Sherwood Park Detachment was advised by the Edmonton RCMP Communications Centre at 1528 hours that a tornado was heading toward Sherwood Park. Eight minutes later, the Strathcona County Fire Department advised that the tornado had touched down on the Sherwood Park Freeway at 17th Street.

From that time (1542 hours) on, detachment telephones were jammed with tornado-related calls. For example:

1547 hrs – Strathcona Refinery security advised the tornado had hit Baseline Road (101 Avenue).
1551 hrs – A propane truck with split tank was disabled at 17th Street and 84th Avenue.
1552 hrs – A 20,000-volt power line was down at 17th Street and Baseline Road.
1553 hrs – Injured people were reported at Mountain Pipeline.
1603 hrs – An ambulance was required at Everall Construction for a critically injured man with a pole through his body.

Patrol units were immediately sent to the area to evaluate the situation and report to the officer in charge of Sherwood Park Detachment, who was at the Emergency Operations Centre, Strathcona County.

Initial observations were:
1) total devastation of buildings
2) vehicles totally damaged and dysfunctional on highways
3) multiple injured persons requiring medical treatment and transportation to hospitals
4) CNR tank cars overturned on tracks (under control – no danger)
5) gas line leaks

Immediate priorities were to:
1) order utility companies to cut gas and power supplies
2) evacuate injured (This was done effectively by the Strathcona County Fire Department and the county Transportation Department.)
3) shut down highways in devastated area by road blocks (highways were cleared and opened by 2300 hours.)

Reports of persons killed started coming in immediately after the disaster struck. General Investigation Section responded to the sudden deaths. The last body was removed at 0200 hours, August 1.

August 1

The industrial area has limited access, so it was relatively easy to secure the area. Three main road blocks were set up to control access, while

continuous patrols on the main highways were maintained to promote a smooth flow of traffic on the freeway and Baseline Road.

By 0600 hours an RCMP mobile command post was set up just inside the devastated area. This temporary detachment became the site command centre until the operation was terminated on August 8.

RCMP emergency response teams from Edmonton and Red Deer were activated to co-ordinate vehicle, building and ground searches of the entire area. Working out of the site command centre, these two units were divided into smaller teams. Attached to these teams were members of the Strathcona County Fire Deparment, RCMP Dog Master, Public Health and Safety, Dangerous Goods personnel, and structural engineers.

An extensive grid search of the entire area was conducted to:

1) search for injured or dead
2) locate, identify and isolate dangerous goods
3) determine which buildings were not safe (done by structural engineers)

This exhaustive search was completed by noon, August 3. Dangerous goods were located, identified, marked and subsequently neutralized. All structurally unsound buildings were taped and marked to ensure that the general public was denied access. Each building or vehicle that was searched was marked with spray paint to ensure that nothing had been overlooked.

By noon, August 3, limited access to the area was allowed. Employers provided the command post with employee lists. Only essential personnel were allowed entry. Sightseers were denied entry for reasons of public safety and protection of property.

A photocopier was obtained and all persons entering the area were required to report to the site command post. If a person was allowed entry, a photocopy of picture identification was reproduced on a "pass" form that was developed for this purpose. During this operation, some 4,000 passes were issued to employers, employees, clean-up and construction personnel.

Personnel from surrounding sub-divisions were sent in to provide 24-hour security and to assist in the continual traffic problems on the freeway and Baseline Road. Two 12-hour shifts per day with 20 members per shift were maintained for the duration.

As well as checking people entering the area, RCMP personnel continually checked departing vehicles for stolen goods. There was no evidence of looting during this operation.

The site command centre was removed and the operation shut down at 1400 hours, August 8.

Strathcona County Fire Department

On July 31, 1987, at 1534 hours, Fire Department Advanced Life Support Ambulance 1-3 was transporting a patient to the University of Alberta Hospital when it was delayed at 17th Street and Sherwood Park Freeway by extremely high winds and heavy flying debris.

While stalled on the freeway, the crew of Ambulance 1-3 saw heavy damage taking place to buildings north of the Sherwood Park Freeway. The crew reported the situation via radio to the Fire Department dispatcher and an alarm was struck to respond to the area.

At 1540 hours a second ambulance, a rescue unit and two chief officers responded to the tornado incident at Sherwood Park Freeway and 17th Street. Following a quick assessment, the deputy chief ordered a general alarm calling in all on-duty, off-duty and part-time Fire Department staff.

Upon their arrival, the chief officers found that traffic had slowed to a crawl. The units eventually made their way to the top of a nearby hill, where they established a command post. From this vantage point they could see incredible damage. People were screaming that there were dead and injured lying in the field; live power lines were down all over the freeway, and buildings were demolished.

Immediate priorities were established and implemented:

1) A temporary command post was established out of the deputy chief's vehicle.
2) All available county ambulances were requested to respond.
3) Casualties in the immediate area were triaged, treated and transported as vehicles were available.
4) Fire Department members conducted traffic control at the outset of the incident.
5) RCMP were requested to close the freeway.
6) Fire Department staff attempted to keep people away from downed power lines.

From 1550 to 1920 hours, ambulance and fire units were directed to the industrial area between the Sherwood Park Freeway and Highway 16 to carry out rescue and emergency medical operations. These operations included treating injuries and transporting injured people where possible, rescuing persons trapped in collapsed buildings and checking on reported gas, propane and ammonia leaks. Areas considered the most dangerous or those with the greatest potential for rescue were concentrated upon first.

The Sherwood Park Fire Station became the off-site staging area for all staff and incoming mutual aid resources.

Initial responding units and crews undertook triage operations and transported the seriously injured. Patients from the Sherwood Park Freeway area were transported to the University of Alberta Hospital, while

patients from the Baseline Road area were transported to the Royal Alexandra Hospital. All available ambulances were being used and one transit bus was commandeered to transport injured persons as well.

At approximately 1550 hours, Edmonton Ambulance vehicles and Edmonton Fire Department companies began arriving on the scene south of the freeway.

At approximately 1800 hours, the deputy chief was notified by the Emergency Operations Centre that a possible second tornado, predicted to arrive within the hour, was expected to follow the same path as the first one. All members of the Fire Department within the industrial area were informed. At approximately 1830 hours the sky again started to turn black in the west; winds began to increase and heavy rain to fall. All units were ordered out of the area. This storm lasted for about 10 minutes and rescue crews were ordered back to continue operations.

Following a meeting with the Director of Disaster Services and RCMP at 2030 hours, a search and rescue team was put in place. The entire Strathcona County industrial area was now in total darkness because utilities had been disconnected. The RCMP arranged for security. Firefighters and RCMP continued search and rescue until 0200 hours, August 1. At 0600 hours new firefighting crews were bused to the site to continue search and rescue. Needed equipment was requested through the command centre.

Search and rescue continued until 1800 hours, when all personnel were transported back to Station 1 in Sherwood Park. Another crew of 30 firefighters continued search and rescue the next morning. Operations were complete by 1800 hours, August 2.

On August 3, members of the Fire Department assisted a group of structural engineers as they assessed the safety of all structures in the area. Buildings determined to be unsafe were tagged with red and yellow ribbon to signify potential danger and to warn that no one, not even owners, was allowed to enter.

Conclusions

Following the incident, several debriefing sessions were held with senior officers, company officers and staff. In addition, critical incident debriefing sessions were made available to all staff in the department. Staff then returned for at least one counselling session with the County Employee Assistance Program supervisor.

Several factors need to be considered for future planning:

1) The Fire Department did not put any special plans or operations into effect to handle the incident. They merely continued to utilize their

standard operational procedures, although on a larger scale. In retrospect, this was seen as a very necessary factor in the planning for future major emergencies. Staff followed the Standard Operating Procedures and no problems were encountered during the incident from an operation perspective.

2) Because the incident was spread over a large area, the department could have utilized a secondary command post on Baseline Road.
3) There was a lack of information and expertise in the handling of dangerous products at the incident. This condition has since been rectified with the purchase of a dangerous goods control unit, implementation of a dangerous goods emergency information management program and additional training for staff on emergency response to dangerous goods incidents.
4) The staff of Strathcona County Fire Department gave all they had, both physically and emotionally, during this incident and performed in a manner above and beyond what could normally be expected. This extra effort exacted a toll on the men and women involved and vividly pointed up the importance of an Employee Assistance Program.

On-site Volunteers

by John M. Bauman

John M. Bauman is an instructor in emergency response and is employed by the Alberta Vocational Centre in Lac La Biche, Alberta. He led a 14-man team from Canada which responded to the Mexico City earthquake of 1985. He was called upon to assist in search and rescue operations at the Millwoods (south side) emergency site following the Edmonton/ Strathcona County tornado. Mr. Bauman has some serious concerns about the state of heavy rescue preparedness in North America.

I arrived at the site at approximately 1630 hours and helped conduct a preliminary search of the area with members of the police department. Approximately four square blocks were affected. Most buildings were of steel construction with some cinder block offices. Most of the buildings were single storey, decreasing the likelihood of casualty entrapment.

The search

In my opinion there was a need to systematically search the stricken area in depth. I assigned a search leader (a paramedic) and approximately 20 volunteers who had been transported from the Edmonton Ambulance Authority headquarters to begin a primary ground search of each structure. Another 30-member team, also headed by a paramedic and comprised mostly of civilian volunteers, began to search the area immediately surrounding the disaster site.

The search was divided into priority areas, the highest being a building where there were reported casualties, the lowest a building where two fatalities had already been discovered. (Employees of the business said that all other occupants had been accounted for.)

The police department had appointed sergeants to direct search parties on the remaining sites. A site command post (a transit bus) was established as a co-ordination point to complement the incident command post already set up by police. Along with the police field commander in charge of search and rescue and the district fire chief, I co-ordinated and directed the efforts of the on-site rescue personnel, including police and fire department personnel and civilian volunteers.

We had numerous pieces of heavy equipment brought to the site, most of which were operated by civilian volunteers. We established potential search areas by interviewing survivors and bystanders, and then we dismantled most buildings by hand on to front-end loaders. In this type of rescue, heavy equipment can be used to move loose debris like bricks and concrete, but only after it has been removed from the structure by hand. Potential survival spots had to be identified and a plan of attack determined for each. Loose lumber was cleared from around the Nault Lumber Yard before darkness, allowing access later in the operation.

On five occasions police dogs were used to search specific buildings, and one body was discovered this way. While police dogs are not trained for this purpose, they served us well. Dogs specifically trained in this type of rescue are used in other countries with considerable success.

A nearby television station offered lighting generators, while additional lighting equipment was obtained from rental agencies and provincial government sources.

Mine rescue teams were requested from the provincial department of Community and Occupational Health. These teams were invaluable in providing manpower and expertise in heavy rescue efforts. While none had previous experience in this type of direct rescue effort, many of their skills were transferrable.

Building occupants and bystanders were asked to draw maps of the structures. If photographs or architectural drawings had been available, they would have greatly increased the effectiveness of rescue efforts. Structural engineers from Occupational Health and Safety Division advised on the structural integrity of each building. Rescuers attempted to locate papers and personal possessions that might provide information about building occupants.

It was important to locate potential hazardous materials. The hazardous materials response team from the Fire Department advised on safety considerations for the rescuers.

Gradually it was determined that the majority of the buildings was unoccupied at the time the tornado struck. As soon as it was determined that each building was free of casualties or hazardous materials, the search shifted to other sites.

Conclusions

Overall general efforts were successful.

1) The existing command structure of the Edmonton City Police served us well. Civilian and other emergency personnel were able to integrate with this structure easily. The sergeants in charge of the sites remained flexible and open to suggestions. This flexibility established excellent teamwork and cohesiveness among the rescuers.
2) Electronic search equipment (infrared scanners, listening devices, etc.) have been used with much success by European teams in disasters. Canada has little experience with this technology. This should be an area of concern.
3) Canine search teams are available in many European countries for this type of emergency. Police dogs are not trained for this. Perhaps there are additional civilian dog teams available in Alberta which could be used.
4) This disaster confirmed that our most valuable resource is the civilian volunteer. Emergency organizations provide the overall structure and guidance while the volunteers are able to provide additional support and expertise. This should be encouraged.
5) We were at a disadvantage because we had little information regarding building contents and the numbers of potential casualties. A subsequent

check with the Edmonton Fire Department indicates that industrial areas like this are not as high a priority (with regard to preplanning, establishing potential fire loads, number of occupants, etc.) as are other buildings such as highrises. I now recognize the importance of collecting the names, addresses and telephone numbers of people who show up with information during the rescue effort.

6) Because of the need to ensure that each site was cleared of casualties, it was necessary to do additional damage to the structures and personal possessions of the owners. When information was received that every person was accounted for at a particular site, we immediately suspended the search on that site.
7) The mine rescuers proved invaluable. They already have their own command structure and training which qualifies them to work in heavy rescue incidents.
8) In Canada, and internationally, there is a lack of information and expertise with regard to heavy rescue. Procedures and protocols have yet to be developed and this leaves us open to trial and error.

Search and rescue from collapsed buildings is a difficult and complex undertaking which few, if any, Canadian emergency services are prepared for, or equipped, to handle. Canada has neither the technology nor the trained personnel to handle such rescue. Further, we don't have an adequate resource list reflecting where such equipment or personnel might be obtained in an emergency. The lack of Canadian expertise in this area should be of great concern to emergency planners, particularly along the Canadian west coast, which is susceptible to earthquakes, and in large urban settings.

Internationally, the most valuable resources concerning rescue from building collapse seem to be European teams such as the Bundesanstalt Technishes Hilfswerk (THW) in West Germany. This 55,000-member civilian rescue organization is dedicated to disaster response and rescue. Having worked with members of this organization in Mexico City following the 1985 earthquake, I conclude that we have a lot to learn in North America.

Surface Mine Rescue Teams, Alberta Community and Occupational Health

This is a summary of a report prepared by Greg Smith, the division's mine rescue co-ordinator. In it he offers important insights into volunteer psychology and the effectiveness of different leadership styles as well as observations on search and rescue mechanics.

In line with its mandate, the division responded to the tornado to ensure the health and safety of workers involved in rescue operations. Some personnel also volunteered their services.

This report deals primarily with the activities of the Surface Mine Rescue Teams and rescue co-ordinators at the two sites where the teams were utilized: the Millwoods and Strathcona County industrial sites.

Organized mine rescue teams have existed in Alberta since before 1905. Originally they were used for underground mine disasters. In recent years, surface mining companies recognized the need for specially trained volunteers who could respond to emergencies at these large industrial sites. The mining industry developed a Surface Mine Rescue Training Program to give volunteers the necessary skills. Since 1981, over 600 volunteer surface mine rescue workers have been trained, and functioning teams exist at most large mines and quarries.

The response

When I realized the scope of the disaster, I alerted the Edson/Hinton and Fort McMurray areas that there was a disaster and that mine rescue teams may be needed.

The teams are called in via a three-stage "Notify-Standby-Respond" system which relies on networking. Contacts in each area were asked to notify rescue workers and determine how many were available, what specialized equipment was available and what their estimated time of arrival would be if called out.

A second call was made, asking each networker to put his area on "standby" status, in which team members and equipment are gathered and tentative transportation arrangements are made.

I was asked to report to the police command post in Millwoods and arrived at 2007 hours. John Bauman was co-ordinating the rescue effort and had determined that heavy industrial rescue skills were needed. (See Bauman's previous report in Section 3 on On-Site Volunteers.) He requested that the Fort McMurray teams be called in immediately and that the Edson/Hinton teams stay on standby to relieve the Fort McMurray teams the next day.

The first teams arrived at 0352 hours, August 1, by company plane. A City of Edmonton transit bus delivered them to the site and became their base of operations for the duration of their stay. The bus offered a place for them to get in out of the rain, to rest, to eat and to plan strategy and was their one link to normality in an area of total destruction.

The first team worked through the night until 1100 hours on August 1. Three teams from Edson/Hinton arrived on site at 1122 hours and worked

at the Millwoods site until 1730 hours when they were able to stand down. It should be noted that the functioning of the site organization had changed dramatically that morning and that the new rescue teams inherited a more disorganized and demoralized rescue site than had been in place for the previous teams.

On that same day a tour was made of the Strathcona County industrial site and arrangements were made for the teams to assist the RCMP on the following day. The teams from the Hinton/Edson area were able to return home on Sunday evening, August 2. The teams from Fort McMurray returned on Monday morning.

Area and site organizations

During the three days that the surface mine rescue teams were active it became apparent that there were a number of organizational structures and philosophies at work.

On my arrival at the Millwoods industrial site the perceived organization was as follows:

The Edmonton Police Department had established a command post and the department was understood to be responsible for co-ordinating all activities within the stricken area. The site commander had asked Mr. Bauman to co-ordinate the rescue activities at the stricken sites. Each site (building or group of buildings) had a police officer who was in direct radio communication with the command post. Mr. Bauman worked through these site officers to co-ordinate the search and rescue efforts. At one time during the night, five separate sites were active and as many as 300 people were digging through the rubble. At each site an ambulance worker was on standby with first aid equipment. Whenever fire fighters were available, they were shared among the various sites and worked together with the mine rescue teams and other volunteers. In this manner, skilled firefighters, rescue teams and ambulance attendants were spread more evenly throughout the affected area. This structure appeared to work extremely well.

The philosophy of the police was very beneficial to the rescue efforts in that the site police officers acted as co-ordinators and expediters rather than attempting to direct the actual rescue efforts. They kept open minds and were receptive to suggestions from rescue workers. Part of the reason for the success of this structure and philosophy was that the bulk of the people on the site were volunteers and were only there to help.

It is a well recognized fact that most policies and procedures are developed to address normal or predictable situations. When attempts are made to adhere strictly to policies and procedures and to apply them to all

situations, difficulties can arise. If emergency response personnel are not prepared to be flexible, then conflicts can arise. Such difficulties started to arise on Saturday morning, August 1. The volunteers who had been working all night were exhausted and those who had been operating the heavy equipment were asking to be relieved. A request for heavy equipment operators from the City of Edmonton was made. At this point, normal operating procedures for city heavy equipment operators proved an insurmountable roadblock to the ongoing rescue efforts. Apparently, city procedures require city employees to operate only city-owned equipment. As the heavy equipment in use at the site was not city-owned, city operators were not allowed to operate it. So heavy equipment was shut down as each volunteer operator left to get rest.

At about the same time, a new fire officer arrived on the site. He felt that he should be in charge of all rescue efforts and confronted the volunteers by asking them who had given them permission to take part in the rescue efforts. The impression given was that the volunteers were seen as "scab" labor. New police officers then arrived who were not fully aware of the history of the rescue efforts. All these factors led to demoralization of the volunteer rescuers and stagnation of the rescue activities.

This breakdown in organization did not last long. However, it did affect the momentum of the rescue operations.

On our arrival at the Strathcona County industrial area on Sunday, August 2, the perceived organization structure and philosophy was as follows:

The RCMP had established a command post for the affected area and were understood to be responsible for co-ordinating all activities within the stricken area. The officer in charge had established an area structure very similar to that of the police at the Millwoods site. The main difference involved the level of control the officers in charge at each site exercised. The RCMP tended to be more involved in directing rescue activities and the rescue teams had less free hand in determining their course of action in each case.

The teams from Fort McMurray prefered the "co-ordinate and expedite" style of the police at the Millwoods site, while the teams from the Edson/Hinton area preferred to work under the RCMP's close control.

Rescue problems encountered

Making the most of available rescue personnel and equipment required constant attention. To ensure that each area was searched as quickly and thoroughly as possible, it was necessary to develop a system. This ensured

that the excavated material was handled as little as possible and areas where survivors might be located were searched first.

The first move was to conduct a "quiet search". All noise-making machinery was shut down and a rescuer was sent into the rubble, calling out to anyone trapped below and listening for a response. Only after the site had been completely traversed in this manner would other rescue operations start. After this initial search, high probability areas were identified and searched. Further quiet searches were conducted at intervals.

When a decision was made to dig through a collapsed building or pile of rubble, a line of rescue workers was established which would remove material in front of them by hand and pass it behind them where it was collected by front-end loaders or bulldozers. These digging lines have a tendency to narrow their focus of activity until only a few are digging and passing material back to many behind them. Rescue leaders had to constantly redirect rescue workers to ensure that as many as possible were digging over as wide a front as possible.

Another problem rescue leaders had was that some volunteers prefered to act as "freelancers" rather than team players. This may have had something to do with a desire to be the first to find a victim, but it was my observation that they contributed very little to the overall rescue operation. The material they moved had to be moved again when the search line reached the area they were digging in.

Heavy equipment is easy to misuse in rescue situations. A bulldozer was seen backing up over an unsearched area of a building before putting its blade down and pushing material away from the building. This is normal digging procedure but not an appropriate method when searching for trapped victims. The rescue co-ordinator had to pay close attention to operations involving heavy equipment.

Each building type proved to offer different problems to the rescuers. Brick or concrete block buildings tended to have entire walls blown out, leaving few cavities for potential survivors. Wooden frame buildings tended to shatter inconsistently, often leaving large cavities where survivors could be found. Steel frame buildings with siding of metal sheeting tended to survive with the basic steel frame still intact, leaving large void areas where survivors could be trapped.

The structure which proved to be the most difficult to search was a building with large prestressed concrete roof beams which had collapsed. Many of these beams were intact and extended their full length. Initial efforts to lift them were unsuccessful. Structural engineers were called in and were able to show rescue teams how these beams could be moved intact without their breaking and folding.

Conducting searches inside collapsed buildings proved to be a problem

because of a concern that moving one part could cause a pile of collapsed material to shift. Cutting steel members was an extremely dangerous activity because it was difficult to predict how it would affect the remaining structural members which were under unusual stresses. Often things only needed to be lifted enough to allow rescuers to look beneath them for casualties.

While it was recognized that searching for casualties was of primary importance, it was also recognized that much damage could be done during the rescue activities to property found on the site. By Saturday morning, August 1, the rescue teams were making a concerted effort to put in a safe place any tools, personal effects, machinery or records they found. Sometimes these effects provided additional information which was useful in rescue efforts. For instance, a photocopier repairman's tool case was found and the police were able to contact his house to determine if he had made it safely home.

Information gained by going through office desks allowed police to identify people who had worked in the building and thereby develop a history on each building.

One concern that was raised by rescue teams was what I term the "sand box phenomenon". This occurs when rescuers get into tearing things down and using heavy equipment much as a child does in his sand box. At some sites rescuers would continue to dig and tear apart a collapsed building after it had been determined that there were no casualties in it. This was particularly disturbing to the mine rescue teams as they recognized that much needless damage was being done.

4 *Medical Response*

Edmonton Ambulance Authority

The Edmonton Ambulance Authority began receiving calls related to the tornado at 1538 hours. As the tornado moved northward, call volume increased and the nature of calls increased in severity.

At 1540 hours, the computer system failed due to power interruption and it was necessary to revert to manual dispatching. This resulted in some data loss.

By 1600 hours additional communications personnel were on duty and staff call-in began.

Between 1537 and 2400 hours, the Authority received approximately 150 requests for service related to the tornado. Total number of patients transported was approximately 85.

Emergency vehicles on duty at the time of the incident included five advanced life support units, five basic life support units and four day-shift basic life support units.

Office staff conducted a call-out to seven surrounding ambulance services with a total of 14 units to assist in city coverage. Two ambulances were seconded from Ambucraft for our personnel. St. John Ambulance was notified and supplied three mobile first aid units and a large number of volunteers.

The outside services maintained city area coverage for normal emergency calls and were also assigned to assist our crews at the tornado search sites. St. John volunteers were moved to various sites to assist in search, triage and treatment of injured.

Edmonton Transit was called to provide five buses at Authority headquarters to take staff to Evergreen Mobile Home Park and the southeast section of the city to evacuate the injured.

Associated Helicopters was called to activate the Alberta Life Flight Medivac Helicopter. The helicopter was manned by Authority paramedical personnel, the medical director and one other physician and was sent to Evergreen to evacuate critical injuries. Seven patients were evacuated by air. An additional critical patient was airlifted from Sherwood Park.

Alberta Public Safety Services' casualty collecting unit was picked up at the Authority's #5 station and sent to Evergreen to be used at the medical triage post. A second unit was picked up at the south side depot and delivered to the southeast search area.

Three triage and command centres were established, one at the Evergreen Mobile Home Park shopping centre and two on the south side. All city hospitals were put on alert and bed status was obtained by Communications.

We were notified that the Charles Camsell Hospital might have to be partially evacuated because its generator room was at risk of flooding. We notified other city hospitals of this so that they could begin preparations.

It is worthy of note that all injured people were evacuated very quickly from most areas. Because of flooded underpasses, a helicopter was used to remove all critically injured from the Evergreen area, and transport time was reduced to five minutes.

Identification of the injured was made by co-workers, observers or relatives. In many situations bystanders assisted the injured out of the rubble to where other injured had gathered, enabling emergency personnel to identify and transport these victims quickly.

Some individuals were dead obviously as a result of massive trauma. In such cases, medical resources were directed to the survivors so time was not spent in resuscitative efforts on scene.

When the second storm front moved through, it was necessary to evacuate all Authority personnel, volunteers and equipment out of the storm's path. Once the front had passed, all personnel resumed activities.

After completing the initial transport of patients to hospitals or evacuation sites, staff participated in search and rescue operations. Standby units were established to attend to rescue personnel and any further victims found.

The Department of Health was called to arrange for psychological support and debriefings. Meals were brought in for staff who had been on duty all day, and volunteers were assisted in finding transportation home. Many went back to assist the police and fire departments on their own time.

Problems encountered

A great deal of difficulty was encountered in responding to calls due to:

- downed power lines
- flooded underpasses
- gas leaks, other hazardous materials
- high volumes of traffic using alternate routes due to downed power lines and flooding
- high volumes of traffic and spectators entering areas of damage
- flying debris
- crews being intercepted by citizens on the way to hospital
- finding injuries on the way to calls

Problems encountered on arrival at damaged areas included:

- severe damage and inaccessibility due to hazard
- wide area of damage
- insufficient manpower to conduct search and/or obtain information on possible victims

- medical examiner's requirement that a rescue site be shut down once a deceased was discovered

Hazards on scene included:
- gas leaks
- live power lines
- debris
- ammonia and other toxic substances
- problems communicating with other emergency services on scene (no interagency communication protocols, equipment, etc.)
- problem communicating to headquarters due to overload

Major communications difficulties were:
- power failure, interrupting computer use for vehicle tracking and logistics
- call volume overload
- call volume overload due to inquiries and information requests
- insufficient radio equipment to establish more than one proper radio position

Edmonton Hospitals

This is an edited version of a report by John Robinson, director of disaster health services for Alberta Public Safety Services. In it, he identifies areas where even the best-laid Mass Casualty Incident response plans can go awry in the face of a complex, multi-site disaster.

The tornado on July 31, 1987, caused the single largest Mass Casualty Incident (MCI) ever recorded in Western Canada. Each of the Edmonton active treatment hospitals and the Alberta Hospital Edmonton (psychiatric hospital) implemented their Mass Casualty Response plans in whole. These plans have been in place for several years.

The Inter-Health Agency Disaster Plan developed by the Edmonton Health Care Advisory Committee was also in place. This plan was developed to deal with several areas of urban Mass Casualty Incident Response. These include procedures to:

1) alert the primary responders (hospitals)
2) collect and disseminate disaster inventory information
3) facilitate inter-agency communication

Following the tornado, a questionnaire was circulated to the city's hospitals to elicit reports of what had happened in the period immediately following the tornado and problems encountered. In addition to specific problems related to each hospital's situation, common problems included:

1) overloaded switchboards
2) casualties arriving in private vehicles, and difficulties in removing them
3) a convergence of people seeking injured relatives
4) difficulties communicating with other hospitals and with the city's Emergency Operations Centre
5) power failures affecting computer and communication systems
6) flooding in parts of some hospitals

Summaries of the reports follow.

University of Alberta Hospital (UAH) 1,200 beds

The UAH was notified by an off-duty paramedic that a tornado was in the southeast area of Edmonton and that the hospital should be prepared to receive casualties. The first casualties came from Strathcona County, not from Edmonton. Consequently they were not asked to complete the disaster inventory. Edmonton Ambulance Authority did notify UAH one hour later that there was a Mass Casualty Incident at the Evergreen Mobile Home Park. The initial influx of casualties from Evergreen arrived in private vehicles. The hospital received a total of 56 casualties and 22 of them were admitted.

Royal Alexandra Hospital (RAH) 933 beds

The RAH was notified by the police at 1545 hours that the tornado had struck. The hospital was never asked to complete its disaster inventory. The first casualties arrived by private vehicles, later ones by ground and air ambulance and transit buses. The air ambulance arrived without warning. There is not a landing pad at the hospital so the ambulance landed on the street. The RAH received a total of 107 casualties and admitted 21.

Charles Camsell Hospital (CCH) 365 beds

Rain and hail caused extensive flooding to the basement, affecting the emergency department and the electrical storage rooms. The hospital was preparing for evacuation long before it was notified of the Mass Casualty Incident at 1600 hours. The CCH first indicated it could not accept casualties. When the flooding threat subsided, it received 25 to 30 casualties.

Edmonton General Hospital (EGH) 778 beds

The EGH experienced basement flooding, power failure and loss of water supply. It was difficult to transport casualties to the hospital because surrounding traffic underpasses were flooded. The EGH was notified of the Mass Casualty Incident by the Edmonton Ambulance Authority at 1650 hours and by 1720 hours had implemented its plan in whole. A total of 14 casualties were received and eight admitted.

Misericordia Hospital 558 beds

This hospital was the farthest from the areas of impact. It became aware of the Mass Casualty Incident from radio and TV reports. Staff had been alerted that the CCH might be evacuated and consequently implemented their plan in whole. A total of 15 patients was received from the tornado sites and two were admitted.

Alberta Hospital Edmonton (AHE) 635 beds

AHE was the closest hospital to the Evergreen Mobile Home Park. Telephone lines from Evergreen were destroyed and AHE became a primary source of communication to the City of Edmonton. The hospital received 29 casualties. Many had major traumatic injuries. They were triaged, stabilized and transferred to active treatment hospitals.

Summary

All the hospitals reported that their Mass Casualty Response Plans were successful in helping them deal with the initial response. These plans are based on the generic model plan used by the Disaster Health Services Branch of Alberta Public Safety Services. Each hospital regularly reviews and updates its plan. Mock disaster exercises had been conducted with several of the hospitals prior to the tornado.

The major difficulties that arose were not in the individual hospitals. They were related to the functioning of the Inter-Health Agency Disaster Plan.

1) The plan is based on a single contained incident occurring in Edmonton. The initial incident happened in the County of Strathcona. The UAH is the closest hospital to Strathcona and the initial casualties went there. Consequently many casualties were already in the hospital before the Edmonton Ambulance Authority notified the hospitals.
2) An estimated 60 per cent of the casualties went to hospitals by means other than ambulance. The Edmonton Ambulance Authority had absolutely no control over this situation. Thus, the initial casualty distribution was inequitable.
3) The Authority's dispatch system suffered a direct lightning strike and the communication system rapidly became overloaded. Delays occurred in contacting hospitals to collect disaster inventory information.
4) The hospitals were not informed when the impact areas had been cleared of casualties. As a result, many staff who were no longer needed were kept on at considerable overtime expense.
5) Failure to collect a disaster inventory created a situation in which available resources were not available.

Lessons learned

The lessons learned on Edmonton's "Black Friday" dispel many of the assumptions generally made by (Mass Casualty Incident) response planners. These are:

False assumption #1.
Casualties will be distributed from an MCI site in such a way that a hospital's ability to cope with a sudden influx of casualties will not be overextended.

The initial casualty flow occurred before the formal emergency medical service response system was established at the incident sites. The majority of the casualties were transported to three hospitals.

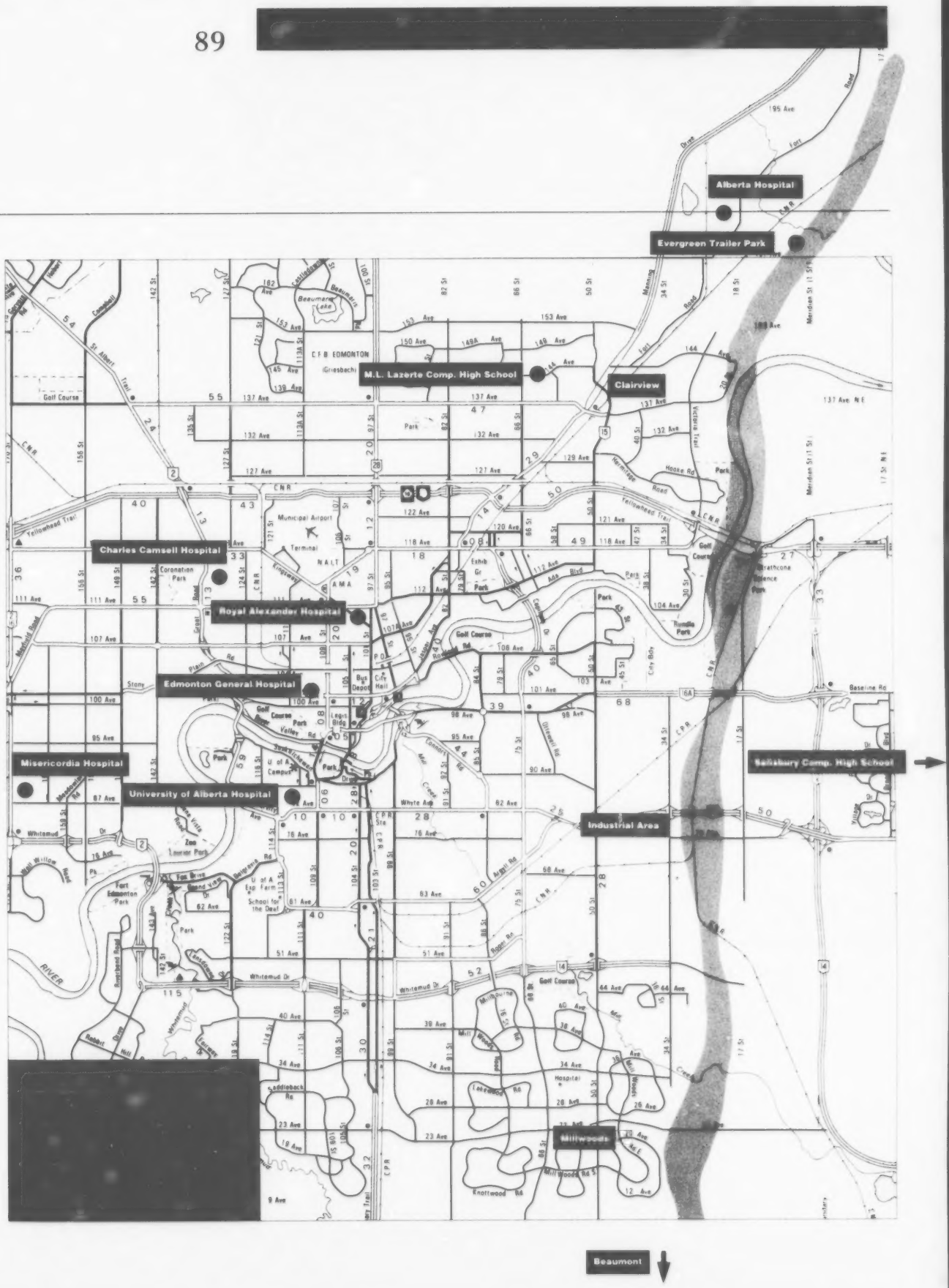
More than 50 per cent of the casualties arrived by private vehicles, many of them having sustained major traumatic injuries. Hospitals had little or no warning of their impending arrival. Several factors contributed to this:

a) The first responders at the impact sites tended to load casualties into any transportation available and send them to a hospital. This has been identified as typical in several other Mass Casualty Incidents.
b) The weather played a significant role. The traditional system of casualty collection is designed to triage casualties and move them into color-coded areas for continuing triage and initial treatment prior to transportation. It was difficult to use this system in torrential rain with the threat of another tornado. Casualties were transported as quickly as possible to the nearest hospitals.
c) The rains caused flooding of major underpasses, making it difficult to reach two of the hospitals.

To be prepared to deal with this initial uncontrolled arrival of casualties, it is critical that the hospital Mass Casualty Incident response plan address the rapid appointment of a reception marshall, triage team and casualty count clerks. Personnel for these roles should not be pre-determined. These roles must be assigned rapidly to on-duty personnel.

False assumption #2.
A communication system will be established between the MCI site(s) and the hospital.

The Edmonton Inter-Health Agency Mass Casualty Incident plan identified Edmonton Ambulance Authority as the communication link between the MCI site and the hospitals. This plan was designed for a single, non-complex MCI. The number of casualties, the number of MCI sites and


Alberta Hospital
Evergreen Trailer Park
M.L. Lazerte Comp. High School
Clairview
Charles Camsell Hospital
Royal Alexander Hospital
Edmonton General Hospital
Misericordia Hospital
University of Alberta Hospital
Industrial Area
Salisbury Comp. High School
Millwoods
Beaumont

the overwhelming convergency of calls at the dispatch centre created a situation in which communication to the hospitals was sporadic or absent.

The Edmonton hospitals were not requested to implement the disaster inventory system and they implemented their Mass Casualty Incident response plans based on the number of casualties in their emergency departments, sporadic information from the formal communication system, rumors, and information broadcast by the media.

The role of a primary first response agency acting as a communications centre in the immediate response period may need to be re-examined.

False assumption #3.
When the hospital MCI response plan is activated, staff will be called back in an organized manner.

Staff callback systems are usually conducted by telephone in a fan-out method. Should this system be effected, a tremendous burden will be placed on the telephone system and all staff contacted will be asked to return to work. In large urban hospitals, this may create a disaster unto itself. The callback process is often complicated by staff returning before being called. In such situations, the emergency department can rapidly become congested with well-meaning people who are, unfortunately, unskilled emergency personnel. Emergency room personnel may be forced to become administrators, co-ordinating the activities of these volunteers.

It is critical that a graduated staff callback system replace the fan-out system in the MCI response plan. Also, the plan should clearly identify an area for called-back staff to report to.

False assumption #4.
The MCI response plan concludes when the last casualty is received.

The need to co-ordinate the collection of casualty information has been clearly identified. This involves the establishing of Relative Information Centres, Victim Information Centres and the issuing of co-ordinated news releases.

It is also important to recognize the emotional impact of a catastrophic incident on individual responders. Such an incident can have an impact that reaches far beyond the scene of the emergency.

The Mass Casualty Incident response plan should provide for post-incident stress debriefing to reduce the impact of staff stress reactions.

Dangerous Goods Response

5

Dangerous Goods Response to the Industrial Area:

Alberta Public Safety Services, Compliance Information Centre

The Dangerous Goods Control Division of Alberta Public Safety Services (APSS) became aware of the situation through the Compliance Information Centre (CIC) as soon as the tornado touched down. The CIC was a primary provincial information and reporting resource in the early warning stages of the disaster until the Government Emergency Operations Centre was activated and fully operational. (The CIC is manned around the clock by compliance officers who answer questions on the shipping of dangerous goods, and respond to incidents that involve dangerous goods and other emergency situations. See the report from Alberta Public Safety Services in Section 2.)

As information began to flow and it became clear that the east-side industrial area of the city had been affected, four dangerous goods inspectors were placed on standby and a chief inspector was dispatched to the City of Edmonton Emergency Operations Centre to liaise with emergency co-ordinators there.

The first call confirming hazardous incidents in the damage zone came from the RCMP at 1745 hours, reporting a CN Rail train derailment. The train had been moving tank cars, some of which were marked showing propane, and they were leaking. There was also a smell of ammonia in the area from an unknown source. The dangerous goods inspectors were dispatched to assist in problem identification and assessment.

Upon arrival, the inspectors encountered numerous dangerous occurrences, including a leaking propane tank car, one 1,000-gallon and two punctured 3,000-gallon propane storage tanks, an oxygen tank leak and at least seven other incidents requiring information, cleanup or containment. The inspectors were in communication with the CIC throughout the evening, receiving assistance in contacting companies to off-load damaged tanks, or in identification of products found in the debris. They also worked with other emergency response groups from the RCMP and the Edmonton police and fire departments to ensure the safety of search and rescue personnel.

At approximately 2300 hours, operations were scaled down. Lack of visibility hampered further work. At APSS head office the minister responsible for APSS requested that a group made up of dangerous goods inspectors and the Pollution Emergency Response Team (PERT) of Alberta Environment be ready to sweep through the affected area at first light. It was decided to reconvene at 0700 hours the next day with more manpower from the Dangerous Goods Control Division to carry out a full survey of the industrial area. PERT was contacted and briefed on the plan of action.

The next morning, seven members of APSS Dangerous Goods Control and three members of PERT gathered at 34th Street and 64th Avenue. Three teams were formed and survey areas were mapped out.

The search began in the debris of 64th Avenue and continued through several construction yards and autobody shops, then moved north to 76th Avenue. Most of the products found were in small quantities and posed no major hazard. The area north of 76th Avenue included the Byers Transport loading dock. Employees of Byers on the scene indicated that numerous types of dangerous materials had been on the dock at the time the tornado struck, including propane cylinders and a shipment of large chlorine cylinders. Some spray paint was obtained from the wreckage of an autobody shop, and team members began looking for dangerous goods and marking them. They also marked the exterior of buildings to indicate any presence of dangerous goods. Both the propane and the chlorine cylinders were located, as were a number of other flammable or corrosive liquids.

The search then moved north of the Sherwood Park Freeway into the light industrial area between the oil refineries. There had been reports of leaking transformers around Veteran Transfer and spills around Pounder Emulsions. The CIC contacted TransAlta Utilities to learn that the transformers were relatively new and contained mineral oil, thus posing no PCB hazard.

There were major problems at Pounder Emulsions, however. Diesel tanks had ruptured and diesel lay on the ground and in surrounding ditches. Across a narrow access road were several asphalt tanks, one of which had a large gouge in it and was still leaking the hot black liquid on to the ground toward a ditch. A burst water main and copious amounts of rain increased the contamination. PERT were informed of the discovery and immediately moved to contain the spill with their equipment.

At midday the teams were split up to operate at various locations. One team investigated a spill and an ammonia smell at Canada Packers. The other headed down to a field north of 51st Avenue and 30th Street, where numerous 500-pound propane cylinders were scattered around in a field. Some were badly damaged and empty, some were leaking and others were intact and full of gas. Those that were accessible were drained by blowing the gas to atmosphere. The high winds dissipated the gas very quickly and rendered the situation safe. A thorough survey of the area revealed a 1,000-gallon propane storage tank partially buried under debris. A valve on the tank was sheared off and the propane was escaping close to a work crew that was using cutting equipment on damaged power lines. The crew was alerted and the Edmonton Fire Department's dangerous goods team was brought in to deal with the situation.

The team at Canada Packers had contacted company personnel to help locate the source of the ammonia discharge. They determined that the ammonia was coming from refrigeration units venting small amounts of gas because the compressors were without power. There was little hazard,

[redacted]

City Boundary
CN Rail
Pounder Emulsions
Tiger Chemicals
Canada Packers
Atlas Crane
Byers Transport
Hault Lumber Yard
Sherwood Park

and nothing could be done to start the compressors until power was restored to the area.

By late afternoon the tally included a 2,4-D herbicide spill at Tiger Chemicals and a leaking 1,000-gallon propane tank at Atlas Crane. The 2,4-D spill was dyked and the propane tank was plugged. Work stopped at about 1800 hours.

The teams reassembled the next morning (August 2). Most of the dangerous goods inspectors were at the command centre of the County of Strathcona search and rescue operation. Each inspector, together with a structural engineer and a group of rescuers headed by an RCMP officer, was assigned to an area. One by one, the buildings were checked for structural integrity and chemical hazards before rescue crews moved in.

In the meantime, efforts were under way to deal with Pounder Emulsions and Tiger Chemicals. Company contact names were needed. Arrangements were being made to bring a 400-barrel storage tank into the Pounder yard so that the spills could be sucked up into vacuum trucks and then offloaded. Also, PERT required someone from Tiger Chemicals to help identify an unknown product spill.

Obtaining a contact name for Tiger was difficult. Not until the team had walked around the building several times and then reluctantly manoeuvred someone through a window did it become apparent that the front door was covered by a brick wall from another building. The effort proved futile. Most of the company records were destroyed or scattered during the storm, and it was late morning before anyone from either Tiger Chemicals or Pounder Emulsions could be reached.

At Canada Packers a ditch containing runoff contaminated with diesel, gasoline and various unknown products was successfully blocked using a D8 cat. Swollen with the weekend's rain, the ditch had been draining into the North Saskatchewan River.

By the next day only a few key personnel were maintained on the scene. For the next week, activity was aimed at restoring a contamination-free environment. Work concentrated on having dangerous goods removed from the area either by their owners or by organizations equipped to handle them. The resources of Chem Securities Limited and the Swan Hills Special Waste Treatment Facility were called in to provide expert advice and disposal options to the many small businesses in the area. A large PCB spill was discovered in a salvage yard containing old transformers, and cleanup arrangements were launched. The water that had collected in the ditch near Canada Packers was tested and found safe to let flow into the river; and the polluted water in the ditch near Pounder Emulsions was taken up in a vacuum truck and disposed of.

Only minor problems arose in the disposal of unwanted or unknown

chemicals until about a week later, when the CIC received a call from Byers Transport concerning the loss of a radioactive source. A bill of lading had been found during the clean-up of the Byers wreckage, and a subsequent check revealed that the product in question had never arrived at its destination. Two dangerous goods inspectors with monitoring equipment from the Radiation Health Branch of Alberta Community and Occupational Health returned to the site and scanned the area for several hours. Nothing was found. The next day the RCMP informed that a witness had come forward to report seeing someone remove a small piece of equipment from the area the day after the tornado. Subsequent RCMP investigation led to the recovery of the device.

Analysis

During the weeks that followed, debriefing sessions were held to discuss what went right, what went wrong, and what could be improved upon. The problem of lack of information on industrial areas came to the fore: who owns the property, what dangerous goods are stored on site, and who is the contact? There is no single place where such information is stored and regularly updated. Resources such as Alberta Community and Occupational Health, Alberta Environment and the city and county fire departments had all been called upon to help locate data and knowledgeable individuals.

Considerable discussion focused on communications. The on-site use of radio telephones by inspectors and the centralized use of the CIC to locate and marshall resources proved invaluable. For the teams searching on foot, however, communications were made awkward by the need to return to a vehicle in order to make contact. Hand-held radios would have been an advantage.

On the positive side, the industrial site commander expressed his gratitude for the help and advice of the dangerous goods responders. Their presence had alleviated a good part of his concern for the safety of search and rescue personnel.

Containment and Recovery of Hazardous Materials:

Alberta Environment, Pollution Control Division

As a result of the direct impact of the tornado on the industrial area north of 44th Avenue, between 17th and 34th streets, considerable damage of direct environmental consequence occurred. Uncountable volumes of hydrocarbons (gasoline and diesel from cars and trucks), flammable gases from welding and heating equipment, and other contaminants entered the environment. The means and extent of distribution of contaminants allowed for only incidental recovery through the associated removal of debris.

Incidents involving major cleanup efforts by Alberta Environment were an asphalt/diesel release from Pounder Emulsions, the loss of various corrosive and other dry industrial chemicals from Tiger Chemicals, the loss of an unspecified volume of anhydrous ammonia from a Canada Packers poultry processing facility, and the loss of concentrated PCB from three scrap electrical transformers at a farm in southeast Edmonton. For the last, the combination of volume, concentration (36.5%), and aerial distribution of the PCB resulted in a major clean-up effort at considerable cost. Canada Packers' singular discharge required a very brief manpower commitment.

These specific incidents did not preclude the initial response and involvement by the Pollution Emergency Response Team (PERT) and other Alberta Environment staff immediately after the tornado's passage. These activities primarily involved identifying dangerous goods and marking buildings containing such materials, and complemented the efforts of Alberta Public Safety Services (APSS) in locating, identifying and stabilizing individual dangerous goods releases and related contaminated areas.

Windsor Farm

The loss of PCBs from a scrapyard located on a farm owned by George Windsor in southeast Edmonton precipitated a lengthy and expensive cleanup endeavor directed by Alberta Environment.

Damages to three PCB-filled scrap electrical transformers situated on the Windsor property resulted in widespread PCB contamination of local soils. The release was discovered on August 3, 1987, by the city police, who responded to a report of an unusual odor at or near the Windsor property and were inspecting the property on the assumption that a casualty might be involved. The officers had no knowledge that the area was contaminated by PCBs.

On August 7, Windsor contacted Alberta Environment to advise that there had been a transformer oil spill. The oil was identified as PCB when a firm contracted to clean up the spill conducted their on-site inspection. The substance was tentatively identified by the typical odor associated with

PCB-filled electrical equipment and by information on the manufacturer's data plate attached to the transformer casings. Lab analysis confirmed that the oil contained 36.5% (365,000 ppm) PCB. During the following week, approximately 725 litres/160 gallons of the residual oil in the transformers was contained and recovered. Approximately 1,270 litres/280 gallons of the oil were lost. The zone of contamination was identified as 120 m x 50 m/ 384 ft. x 164 ft. By mid-September, the entire contaminated area had been fenced and secured.

Alberta Environment, APSS and Windsor have entered into negotiations over access and eventual land use of the property in question. Concentrations of .5 ppm of PCB in soil renders the land unfit for agricultural production and the property will likely have to be rezoned for light industrial use. The costs associated with recovering the contaminated soil to a maximum PCB concentration of 50 ppm are anticipated to be in excess of $1 million. Alberta Environment's role at the site will be to ensure that the clean-up standards are met. On-site inspections, as well as periodic sampling, will also be conducted.

Pounder Emulsions

At approximately 1145 hours on August 1, Alberta Environment received notification from APSS of an extensive hydrocarbon (tar, asphalt emulsion, tall oil) spill at the Pounder Emulsions site. The immediate overriding concern was to minimize the loss of hydrocarbon contaminants to the North Saskatchewan River and to establish containment features in order to facilitate recovery of the spilled material. Extensive monitoring of the North Saskatchewan River was initiated to determine if any significant quantities of contaminants had entered it. This program was carried out for one week.

Temporary repairs of the bulk storage tanks at Pounder were completed to stem the flow of hydrocarbons from the site. Damage to the storage tanks was extensive and some were obviously beyond repair. Some tanks were completely missing from the site, and migration of the contaminant towards and into the river was heavy.

Two sand dykes were constructed in the ditch next to the rail spur east of the Esso refinery in order to stem the hydrocarbon spill. The problem of controlling the large volume of spilled hydrocarbon was compounded by heavy rainfall following the tornado. Vacuum and tanker trucks were deployed to the site to recover the spilled material contained behind the dykes. The water level behind the dykes was periodically lowered to avoid a breach. Control features had been constructed to meet the need.

The integrity of the dykes was monitored on a 24-hour basis over the

following two days. Company officials were contacted to direct the cleanup of the ditch leading from Pounder and running adjacent to the rail spur. By September 22, 1988, the area affected by the spill from Pounder Emulsions had been satisfactorily cleaned up.

Tiger Chemicals

Tiger Chemicals is situated adjacent to Pounder Emulsions and also suffered extensive tornado-related damage. The exact quantity of chemicals lost from the site, including herbicides, dry caustic, and various agricultural products, has not been clearly established. Overall volumes were estimated to be quite low, however. Apart from the volume of material that was directly removed by the tornado, contamination was restricted to the ditches in the immediate vicinity of the building.

Contaminated discharge from the yard was channelled into a dyked depression and was thought to contain unspecified amounts of herbicides (2,4-D) and various other agricultural products, as well as dry caustic chemicals for use in pulp and paper manufacture. An unknown amount of this discharge likely entered a major north-draining ditch and could conceivably have entered the North Saskatchewan River.

Hazardous materials inventory

On August 6, an inventory of hazardous wastes generated in the industrial area as a result of the tornado was carried out. The project was co-ordinated by Alberta Environment and involved PERT, APSS dangerous goods control inspectors, the City of Edmonton Fire Department's dangerous goods response team and fire department representatives from the County of Strathcona.

The primary objective of the inventory was to identify and assist in the handling and disposal of hazardous wastes generated by the tornado. A number of specific concerns prompted the inventory:

1) Clean-up tasks were being performed by workers not necessarily familiar with the hazards associated with specific chemicals or potentially hazardous wastes.
2) Hazardous materials may have been transported from their points of origin, thereby posing a handling and disposal problem to people unfamiliar with a specific substance or its associated disposal requirements.
3) Hazardous materials identified during the initial walk-through of July 31 to August 1 may have been neglected or mishandled as a result of stress or fatigue.

The inventory group was specifically interested in the type and volume of hazardous wastes or materials, which materials could be handled by the property owners, and how the owners intended to handle them. Environmental problems associated with the spills and leaks, and the relative roles of Alberta Environment and APSS in providing advice or assistance in handling and disposal were also addressed. An inventory form was drawn up.

The industrial area between Baseline Road and 44th Avenue, and 34th and 17th streets, was divided into areas of approximately 2.5 square kilometres or one square mile. The inventory group was split into teams of two, and each was assigned an area through which it conducted a door-to-door survey. A visual inspection was made of residential properties, railway rights-of-way and any industrial properties where there were no personnel in attendance, or where available interview information was incomplete.

Various hazardous materials and wastes were documented, including a partial list of compressed gases, various corrosives, transformers, hydrocarbons, pesticides, and even a radioactive source item. The vast majority of wastes was adequately handled and disposed of by individual property owners. Disposal advice was given in several instances, and inquiries were referred to the Waste Management Branch of Alberta Environment. The Alberta Special Waste Management Corporation also offered its assistance.

The inventory not only served to identify the extent of the hazardous waste problem facing Alberta Environment, but also helped to reassure local businesses, residential owners in the stricken area and the public at large that the issue of environmental contamination resulting from the tornado was being addressed and that mitigative action was underway.

Public Works and Utilities

6

Edmonton Power

The tornado created major power interruptions and damage to power installations. During the emergency, the Edmonton Power Control Centre directed field personnel in preventing life threatening situations and proceeded to disconnect and reconnect power services as conditions permitted. Damaged components were repaired and services were systematically restored when it became safe to do so.

During the peak of the disaster, more than 150 off-duty operational staff members were called out to restore services. Many worked around the clock and forfeited the long weekend to ensure safe restoration of services.

The following is a more detailed report of the activities of the Northside underground crews, who worked in most of the affected areas over the weekend:

As soon as it became evident that crews would be required for a massive repair effort, all available personnel were asked to work. Although most of the damage was to aerial lines and poles, Northside crews were utilized wherever they could be.

On Friday, July 31, our crews were used to cut lines clear along 76th Avenue from 17th Street to 34th Street. Aerial lines had to be cut clear and moved off the road. Once this area was cleared, we were dispatched through central operations to 68th Avenue and 35th Street. When crews arrived in the vicinity, they were denied access by city police. Operations then sent our crews to 23rd Avenue and 34th Street to assist line crews setting poles and directing traffic. Operations directed some of our crews to the Millwoods area to patrol and remove debris from any power electrical equipment in the affected areas.

When these areas had been cleared, crews were asked to go to Clareview to patrol customer laterals. The lateral at 18th Street and 153rd Avenue was down and required further attention. When our crews had done all they could in this area, they advanced to the Evergreen Mobile Home Park on directions from power operations. At that time, all that could be done for Evergreen was to assess the damage to power equipment in the area and assist line crews setting up the pole line that had been removed by the tornado. The line crews continued replacing the pole line along the south and east perimeters of the park.

On Saturday, crews were dispatched to Eastgate Industrial Park and Hillview School. The Eastgate park was restored by switching damaged areas clear, and a faulted transformer was changed at Hillview School. One crew was called back to Eastgate because of a downed aerial line. The power was restored to this area by opening a lateral switch and re-energizing the circuit feeding into the area. The rest of the customer lateral switches were patrolled for damage. With these areas back in

operation, our efforts were concentrated on re-establishing power to the unaffected areas of Evergreen Mobile Home Park. In order to do this, a power command post was set up. Customers who required power could get an electrical inspector and a service person to inspect their trailer wiring and if it was good, to close in the secondary service cables, thus providing power. Power was restored to 150 units on Saturday. While some crews were kept busy at Evergreen, other underground crews were clearing trees from aerial lines and splicing secondary services.

By Sunday, most of Edmonton had power restored with the exception of some residences of Evergreen. The command post was re-established, and more mobile homes were supplied with power throughout the day. As more areas were opened by police, some people could not be supplied because some transformers could not be energized at that time.

On Monday, crews returned to Evergreen to complete the re-energizing of the remaining transformers that had not been damaged by the tornado. Customers continued to have their services turned on, leaving only a few mobile homes that could be turned on to be energized on Tuesday.

City of Edmonton, Transportation Department

The primary role of the Transportation Department during tornado emergency operations is to provide for the protection of the public on all roadways, walkways, bikeways, and river crossings in the immediate and surrounding area, including the parks system; and to provide regular transit service wherever possible and buses for evacuation of residents and transport of emergency personnel.

The City Engineer responded to the Emergency Operations Centre in City Hall at 1630 hours on Friday, July 31. Emergency control centres within the department — Roadway Operations, Traffic Operations and Edmonton Transit — were activated immediately and remained in operation through Saturday, with operational staff remaining in the field through Monday. The activities of those centres were as follows:

Engineering/Division Control Centre (DCC), Central Yard

Roadway Operations

Activities:

- provided crews and equipment to Evergreen Mobile Home Park and the Strathcona Industrial Park to haul rubble to secured sites, build new access roads, assist in the search for victims and survivors, and haul materials for other departments and agencies
- provided monitoring and inspection of roads for flooding and downed trees or branches
- provided dispatch control, telephone answering and central stores control
- provided cleanup of flooded roadways and debris in all areas of the city
- provided subsequent cleanup of debris in road right-of-ways near the damaged areas

Problems encountered:

- control centre and operating staff were not advised of the magnitude of the destruction
- lack of communication, access to field command centres, and authorization of unmarked department vehicles into disaster sites
- internal concerns including inaccurate employee phone numbers, lack of availability of keys to vehicles and facilities, lack of space and equipment in control centre

Traffic Operations

Activities:

- provided road closure leading to and from tornado sites for emergency routes, downed power lines and debris on roads
- provided on-site barricading and signage at damaged sites
- provided emergency troubleshooting and operation of traffic control system
- provided computer monitoring of traffic signals
- provided dispatch control to field crews
- provided cleanup of barricades and signs and installation of traffic control devices subsequent to the storm

Problems encountered:

- many barricades were ignored and moved by people coming into the area to sightsee
- jurisdictional problem between city police and RCMP created difficulties

[redacted] Edmonton Transit Operations Control Centre, Churchill Station

Activities:

- provided 15 buses and operators to the Evergreen site and six to a warehouse site near the Strathcona Industrial Park for evacuation, plus several buses on standby at various locations
- provided shuttle bus service for city emergency crews
- provided monitoring, dispatch and reroute control to operators
- provided inspection, repair and restoration of LRT track
- provided inspection and clean-up of bus shelters, vehicles and facilities

Problems encountered:

- a 2.5-hour disruption to LRT service occurred due to power failure just prior to the tornado, and numerous further disruptions to LRT and regular service occurred due to wind and flood damage
- information about the magnitude of the emergency was slow in reaching field personnel
- road access by emergency personnel was almost impossible due to flooding and stalled vehicles
- sporadic telephone service made contact to some areas difficult

Edmonton Water and Sanitation

Drainage Network Section

The Drainage Network Section was required to provide a high level of emergency response as a result of the tornado and accompanying rainstorm.

The tornado sucked the air from inside a major storm outfall located in the Clareview subdivision, collapsing 330 metres/1,080 feet of the 410-metre/ 1,345-foot pipe and causing roughly $2 million in damage.

The initial response at the time of the storm was to increase the number of dispatchers on duty from two to five and to call in all off-duty field staff. In total, 78 personnel worked in the period up to midnight on July 31, the day the tornado struck. The work conducted included replacing blown off manhole covers, clearing catch basin lines and faces, releasing blocked storm sewer lines, and some basement cleaning. Assistance was provided in emergency pumping at two pump stations.

From midnight to 0730 hours on Saturday, August 1, a response crew of 10 personnel was on duty. Beginning at 0730 hours, 60 personnel were brought in to assist homeowners in the cleanup of basements. Some equipment was on duty to clean plugged catch basins and sewer lines. This work proceeded until 1930 hours. On Sunday, August 2, 45 personnel were brought in to continue cleaning flooded basements. By Sunday evening 313 flooded basements had been reported, with cleaning and disinfection provided to 250 locations. No crews worked on Monday, since no backlog of cleaning existed. Cleaning of basements continued on Tuesday, August 4.

In total, the Drainage Network Section responded to 476 flooded basements, replaced 39 manhole covers and cleaned 73 flooded street locations.

Gold Bar Wastewater Treatment Plant

Gold Bar maintenance staff were intensely involved in maintaining the services of all pump stations during the tornado/heavy rainfall. Several areas were temporarily flooded during the severe storm.

At about 2130 hours on Friday, July 31, the 109th Street underpass was found flooded by the pumpwell crew. The crew also noticed the drywell of the pump station was completely flooded, resulting in pump failure. With the help of submersible pumps and a portable diesel pump, the underpass was pumped out by Saturday at about 1800 hours. There were 57 alarms from other pumpwells between 1541 and 1819 hours on Friday.

The plant proper was not affected by the storm, with the exception of heavy inflow of diluted raw sewage in the order of 1300 ML/D.

Clover Bar Lagoon supernatant pumps and air blowers were inoperative due to power failure. They were re-started on Saturday morning.

Water Treatment Section

Power outages were experienced for varying lengths of time at the Rossdale Water Treatment Plant, the E.L. Smith Water Treatment Plant and all reservoir and booster stations except Millwoods and Clareview reservoirs.

Throughout the crisis from its beginning at 1524 hours until full service was restored at 2300 hours, the distribution system computer was up and running on backup power supply and the data and conditions in the system were always known to water treatment staff.

Various plant personnel were dispatched to the field reservoirs and plants during the power outages to reset the systems locally. This enabled the quick and successful restoration of water supply to the customers. With the exception of East Millwoods - Burnewood Area (supply interruption of 240 minutes) and the central and north part of the city (supply interruption of 60 minutes), the remainder of the city experienced loss of supply or drop in pressure for less than 20 minutes. The West Millwoods and Clareview areas experienced no supply interruptions.

Water Network Maintenance

At the Evergreen Mobile Home Park, crews shut off water lines to prevent further water damage. On Sunday and Monday, August 2 and 3, crews worked around the clock to restore service. During that time crews repaired approximately 200 to 250 leaking services, two valves and two mainbreaks.

edmonton telephones

'edmonton telephones's initial involvement with the emergency response phase of the tornado-caused emergency began with unsolicited responses by representatives of Installation and Maintenance and Outside Plant Operations. Both representatives, acting on their own initiative, arrived at the Evergreen disaster site almost one hour before the area was declared a disaster zone.

One of these men, the director of Outside Plant Operations, dispatched himself to the Evergreen site and had assisted the police in establishing their communications command module by 1730 hours that evening.

Once communications were possible with the administrative offices, 'edmonton telephones's Outside Plant Command Centre and Installation and Maintenance Command Centre were activated and call-out procedures were implemented. All of these moves were made before 'edmonton telephones' received any formal notice of a requirement for its services.

Throughout the weekend 'edmonton telephones' personnel worked on the emergency response phase at the disaster sites, in the administrative offices and at the wire centres and remotes across the city.

By 2000 hours on Friday, the evening of the tornado, 'edmonton telephones' had placed 12 telephone lines for public emergency telephone service at the mobile home park. By 2200 hours, 20 lines were available. On Sunday morning the Red Cross had two additional telephone lines installed at their administrative centre to ease the congestion on their existing service.

Previously, 'edmonton telephones' had provided emergency lines between the Red Cross Centre, City Hall and Victim Assistance Centre at M.E. LaZerte Composite High School.

The storm demolished the Evergreen remote exchange, which served some 573 customers in the mobile home park and surrounding district. By 1900 hours on Monday, August 3, 'edmonton telephones', with the help of Edmonton Power and McGregor Telephone field crews, relocated a complete remote wire centre, re-establishing 440 telephone lines. In the process, 'edmonton telephones' ran seven kilometres/4.3 miles of fibre optic cable and spliced 13 different locations, amounting to over 100 fibre splices. Additionally Outside Plant forces installed massive amounts of underground feeder and distribution cable only to have to repeat the process after contractors inadvertently tore up the buried cable.

Over the weekend 'edmonton telephones' cleared up 640 tornado-related trouble calls. Some 47 businesses in the southeast industrial area had temporary emergency telephone service by 0700 hours on Saturday.

Extra lines were installed for insurance companies anticipating a flood of calls from insured disaster victims.

Homes in Clareview and Millwoods, where habitable, were restored to service by mid-afternoon on Sunday.

Northwestern Utilities Limited

Northwestern Utilities Limited is the supplier of natural gas to Edmonton.

Response to the events of July 31, 1987, at Northwestern Utilities Limited (NUL) was swift and effective, aided largely by the time of day. Had the destruction occurred even one hour later, consequences might have been much more severe. As it was, a full complement of operating personnel was on duty and was retained by supervisors in anticipation of the demand for services. As the evening wore on, off-duty personnel offered their assistance, and many worked all weekend. ICG Utilities also offered to help, although this was not necessary because of the number of our own employees who were available.

Our first hint of disaster came at 1524 hours when the Dome Petroleum plant was reported down due to power failure. At 1530 hours the computer in the Control Centre went down, and at 1540 hours Customer Services received the first gas odor call from the industrial area. There followed a deluge of phone calls requesting disconnections. Ultimately, a total of 1,607 customers had service disconnected because of the tornado.

Operating staff who entered the damaged areas reported scenes that resembled war zones and worked under difficult and sometimes dangerous circumstances.

One of the first employees dispatched got lost amid the confusion and arrived near 64th Avenue and 30th Street, which was one of the hardest hit areas but not the location to which he had been called. "It was like a bomb hit," he recalled later. "People were dazed and in shock...we just pulled out our wrenches and went to work turning the gas off." This done, he and his co-workers offered their assistance to the police and helped carry the injured to ambulances.

Forbidden by power workers to drive their trucks under downed lines hanging perilously over the road, Northwestern's utility men walked under and over power lines to reach buildings where gas was escaping. Others crawled and clawed their way through wreckage to reach regulating boxes. At Grosvenor Industrial Park "you couldn't even see the risers", they reported.

Despite flooded streets, roadblocks, broken lines, escaping natural gas and downed buildings, an orderly shutdown of large areas was accomplished, ensuring the public was not endangered. The valve assembly serving the Strathcona County industrial area, where a station was reported destroyed with gas blowing at 1555 hours, was closed at 1620 hours. Gas to the industrial area south of 76th Avenue west of 17th Street was turned off at 1645 hours. Evergreen Mobile Home Park was shut off at the regulating station at 1730 hours.

At 1730 hours, the district manager arrived at the Emergency Operations Centre at City Hall with a portable company radio to find operations well underway. A separate phone and number was assigned to

NUL, and there was ready access to police, fire and other officials.

At 1745 hours, Customer Service reported numerous public inquiries apparently originating from a CBC radio broadcast advising customers to shut off their gas. At 1800 hours, upon the advice of NUL's district manager, the Emergency Operations Centre issued a news release asking residents not to turn off their gas "contrary to some media reports". Gas had already been turned off in all the affected areas.

After Northwestern Utilities had assessed the total impact of the damage, natural gas service was restored in most of the affected areas within 48 hours of the storm. Less than 24 hours after the storm, 611 residents of the Maple Ridge and the nearby Oak Ridge mobile home parks had service restored.

At Evergreen Mobile Home Park, plans for restoration of service began the day after the storm. Relights were underway within two days of the tornado and about half of those who could return to their homes had service restored within three days.

NUL also lent some much-needed lighting equipment to aid in the night's rescue efforts, and heavy equipment and experienced operators to help move wreckage.

In the hard-hit industrial areas, risers were locked off in anticipation of demolition work. Concerned that risers or piping might be damaged by equipment, NUL staff were busily locating and tagging NUL facilities to warn of the presence of natural gas until fully one week after the storm.

Northwestern Utilities sustained varying degrees of damage to several regulating stations. At a Strathcona County industrial area station, located near 17th Street and the Sherwood Park Freeway, the interior piping was left standing while the building and fencing were reduced to rubble.

Analysis

On October 26, 1987, Northwestern Utilities' Edmonton managers met to review the tornado incident and the company's response.

There had been no difficulty obtaining adequate staff to respond to the emergency. This was due to the time of day. People were commandeered before they had a chance to go home. Just an hour later, obtaining the same staff complement would have required a substantial number of phone calls. The suggestion was made to investigate the call-down system practised monthly by the Edmonton Area Pipeline and Utilities Operators Committee for possible application at Northwestern Utilities.

It was also suggested that a Weatheradio receiver be obtained for the switchboard and possibly other locations to insure early warning of weather-related incidents.

The question of after-hours access to the company locator and curb valve books and customer service orders arose. Pre-arrangements for activating systems were required.

It was pointed out that all the vehicles and equipment of our southside operations were concentrated in a single location. Had the tornado struck us there, our response would have been seriously disadvantaged.

Finally, while access to emergency sites had not been a problem when NUL staff appeared in company vehicles — except on the odd occasion when RCMP officers from out of the district did not know who the response organizations were — personnel in private vehicles would not have fared well. It was suggested that plasticized company identity signs, suitable for placement on a dashboard, should be made up and stored in locations from which personnel are dispatched.

Alberta Government Telephones

Compiled by the Provincial Service Co-ordination Centre, Network Management, Calgary, and Dave Brundage, a writer in the Edmonton office.

When the tornado touched down in Edmonton at 1515 hours on July 31, 1987, it triggered a response in Alberta Government Telephones (AGT) that reached across the country.

Major damage occurred in the area served by the AGT Sherwood Park exchange. About 30 people working out of the Plant Work Centre on Coronet Road and many more in the local exchange office and the downtown test centre responded immediately.

Outside workers ran temporary cable and wire, cleared fallen cable, and repaired lightning-damaged installations and downed drops. Six temporary pay stations were installed in the industrial park area to restore communications. Cables and telephone terminal boxes damaged beyond repair were put out of service.

Widespread cable damage threatened operation of the Sherwood Park office. In many cases, power loss shut down mini-computers used to drive business telephone installations. AGT replaced inoperative business multiline equipment with single-line service not requiring a power source.

Just north of Baseline Road, 1,000 metres of aerial cable were destroyed, severing connections to TransAlta Utilities, whose emergency teams urgently needed communications and remote control links. AGT installed a 25-pair cable to connect the utility and began work to install a 200-pair cable.

In the affected exchanges, employees put business telephone numbers on intercept and call forwarding so as few business calls as possible would be lost. Operators on duty when the tornado struck worked overtime. Those scheduled to work later were asked to come in. Every Toll Operator Position (TOPS) in Edmonton and Calgary was filled. Grande Prairie, Vegreville and Camrose also handled re-routed calls. For the day, 365,000 operator-assisted attempts were made, in and out. The normal daily volume is 140,000.

The Provincial Service Co-ordination Centre (PSCC), Calgary, first became aware of problems in Edmonton at approximately 1745 hours. At this time staff discovered that the network management data link to the Edmonton and North Toll Centre switches was down. Network management assistance was requested in both Calgary and Edmonton and arrived at both at 1830 hours. Call-out response time was good considering it was the start of a long weekend.

The Edmonton DMS 200 (Digital Machine Switch), working at maximum capacity, could not respond to status inquiries. The switch normally handles 960,000 attempts in and out daily and from one million to 1.5 million on Christmas Day. On the day of the tornado, the switch received 2.3 million attempts. Extended Flat Rate Calling (EFRC) equipment, which handles 200,000 on a normal day, logged 838,000 attempts. The Provincial

Service Co-ordination Centre, network management, Calgary, faced overload as some switches in Alberta were close to collapse. The facility management placed controls on traffic into Edmonton, requesting operators to place emergency calls only, and juggled calls among the other major switching centres. The Provincial Service Co-ordination Centre coordinated efforts of similar operations in Vancouver, Regina, Winnipeg and Montreal. This initial action was accomplished within 30 minutes of staff arriving on site and prevented any worse spread of congestion into the toll network. Telecom Canada member companies stood on alert to assist. In Red Deer, the emergency microwave trailer was placed on standby.

The Network Operations Centre, Edmonton, called in extra staff for call control.

As soon as the situation started to stabilize, network management communication with the North Toll Centres was re-established (2015 hours).

The Calgary network manager decided to take the Edmonton switch out of High Performance Routing (HPR) as a tandem switch but to leave it as an I Node (normal switch status in Fixed Hierarchical Routing) so it could benefit from any spare capacity on the remaining HPR groups. While this would not have had a significant effect on relieving Edmonton's congestion, it did help a bit by ensuring no additional traffic was being sent to Edmonton. Evidence from an earlier situation showed that the network processor would immediately start recommending a switch as a tandem once it no longer received overload indicators from the switch. Edmonton was going into and out of an overload situation several times during an hour and did not need additional traffic during the short periods it was not in overload.

Emergency numbers were being broadcast on TV. By 2030 hours, Toronto networks were broadcasting 421-2213 as a number to call for anyone concerned about friends or relatives. Later other numbers were added. Tens of thousands of calls were being generated within North America towards these numbers every hour. Network managers across the country applied 75 per cent code blocks in an attempt to diminish this focused overload into Edmonton. Even with these controls, the Edmonton switch was receiving more than 3,000 attempts every 15 minutes during the times of heaviest calling. Complaints were being received from other provinces from people not being able to reach the numbers. Operators were also receiving complaints from customers who had received the recording instructing them to place emergency calls through their operators. When an operator would attempt to place the call she would receive the same announcement. Calls being made through the INWARDS operator in Edmonton stood an excellent chance of reaching busy or No

Connection (NC) in Edmonton. In an attempt to relieve the situation, our public relations people were asked to notify the media that there would be problems completing the numbers. They suggested the numbers be used for emergencies only.

Calgary, Red Deer and Lethbridge toll switches started to become congested, and controls were implemented locally and nationally to take attempts off their switches.

By approximately 2230 hours, the situation on the Edmonton switch was starting to stabilize. Code blocking of the emergency numbers appeared to help some. Edmonton was still experiencing a bit of Receiver Attached Delay Recorder (RADR) and high CPU occupancy but not to earlier levels. Controls were gradually backed off, starting out of province. By 2345 hours, all out-of-province controls were off except the code blocks, and the Edmonton switch was remaining stable. All other controls were then reduced and finally removed by 0049 hours. Incoming attempts to Edmonton were reduced to a manageable level and by 0130 hours it was quiet enough for the network manager to leave.

Anticipating heavy calling in the morning, the network manager returned at 0745 hours. Directional Reservation of Equipment (DRE) was applied to Edmonton subtending toll centres to give priority to Edmonton calls. By 0900 hours, Edmonton switch was starting to experience heavy congestion, so controls were applied as before throughout the two regions.

As repair work proceeded after the storm, call traffic remained high. Between noon and 1200 and 1300 hours, August 1, 277 long distance operators were on duty, compared to 176 who handled calls in the same time frame one week earlier. Many worked two or three consecutive shifts.

Calgary broadcast 17 Hard To Reach (HTR) codes into Edmonton and recommended both regions apply 75 percent code blocks in an attempt to be more selective in controlling. Once the Code Blocks (CBKs) were in place, a significant difference was noted and the earlier trunk blocks could be removed. The Hard to Reach Code Blocks proved to be our most effective control. Network management remained in the Provincial Service Co-ordination Centre until 1600 hours to ensure the network remained stable. Periodic calls were made throughout the evening to check on the incoming attempts and CPU occupancy of the Edmonton switch as well as attempts and overflow on the Hard to Reach codes.

The network management centre was again manned Sunday night (August 2) between 2000 and 2200 hours as this has usually been a very heavy calling period. Call volumes were down from what was expected and additional controlling was not required. Since the Edmonton switch was handling the calls so well, it was decided to remove the code blocks to the Hard to Reach codes at 2100 hours. The switch remained stable.

Following the tornado, intercept and call forwarding were provided from the Victim Assistance Centre set up in the Salisbury Composite High School in Sherwood Park. Mobile telephone units were provided to business customers from the industrial areas not previously serviced by repair crews from the Sherwood Park office.

TransAlta Utilities

The damage caused by the tornado left a gaping hole in TransAlta's transmission line system in southeast Edmonton. Damage to company facilities amounted to nearly $8 million and it took nearly six weeks to complete permanent repairs.

It is estimated that the tornado's funnel carried winds gusting to 300 miles per hour. The winds twisted steel transmission towers and shattered wooden pole structures. TransAlta Utilities lost 49 240-kV double circuit steel towers, 17 138-kV double circuit steel towers, 134 138-kV single circuit wooden structures and about 100 distribution poles. A substation in Edmonton's Refinery Row was also destroyed. In all, the tornado disrupted facilities on about 20 kilometres/12.4 miles of the company's transmission system right-of-way, including everything for 12 kilometres/7.5 miles south of TransAlta's major 240-kV substation in Refinery Row. Fortunately, the tornado missed the substation by about 100 metres.

The most severe damage ocurred in Edmonton's industrial Refinery Row area and the Strathcona County industrial area. The communities of Beaumont and Leduc also felt the effects of the twister.

TransAlta crews and equipment were out making repairs as soon as it was safe to do so. Because of debris left in the tornado's wake, repair crews had to clear rights-of-way before work could start on restoration of power. Crews reported numerous flat tires due to the heavy debris. The extreme winds resulted in some limited electric outages in areas south of Edmonton and in Sherwood Park. Interruptions of a longer duration occurred in Refinery Row on the eastern edge of Edmonton and in the Strathcona County industrial area. By Saturday morning, August 1, electric service was restored to most areas that were capable of receiving electric power.

Victim Services – Government

7

Victim Assistance Centres

This is an edited version of a report submitted by Rod Stutchbury, a training officer with Alberta Public Safety Services.

Less than 24 hours after the tornado, the first of three meetings was held in the Government Emergency Operations Centre at Alberta Public Safety Services (APSS). Representatives from Emergency Preparedness Canada, various provincial departments, the City of Edmonton and the counties of Strathcona and Leduc met to consider how the vast array of services and resources at their command might be delivered, quickly and efficiently, to all those who had been so suddenly and unpredictably disadvantaged. The unanimous answer, "one-stop" victim assistance, had existed in the literature of disaster planning for some time, but had never, to anyone's knowledge, been implemented — certainly not on the scale now envisaged.

At that first meeting, it was considered that four assistance centres would be established. Service had to address need. Some of the victims had lost homes and possessions, surviving with barely their lives, and others had lost the means of their livelihood. Two centres in Edmonton, one in Strathcona County (Sherwood Park), and one in the County of Leduc, were proposed. Two working groups were assigned to develop the arrangements for the services and assistance to be offered at each centre. The actual locations would be decided by the municipal governments.

The centres in Edmonton would look after the needs of those who had lost their homes or personal property. The Strathcona County centre would deal with the businesses damaged in the industrial area and employees who would be temporarily unemployed because their firms were damaged. It was expected that the victims using the Leduc centre would be farmers. This breakdown was not restrictive. Some business claims were received at the Edmonton centre and some individuals reported to the Sherwood Park centre.

At the second meeting, the next morning, strong recommendations were made for a single centre in Edmonton to avoid duplication of efforts and communication difficulties. The original idea had been to have a centre close to the damaged areas of Clareview and the Evergreen Mobile Home Park and another in a different area of the city. Community health representatives felt that a centre in or very close to the damage zone might be detrimental to the victims.

The Edmonton centre: M.E. LaZerte

The M.E. LaZerte Composite High School location was particularly appropriate. It is designated a "community school", oriented to the requirements of outside use, and has a co-ordinator and staff who are used to dealing with outside groups. The draft Social Services portion of the Edmonton Emergency Response Plan had identified it as the location for a reception centre in the northeast corner of the city because of its size and facilities.

The usual reception centre approach in a disaster is designed to meet the immediate needs of survivors for lodging, food, clothing and other personal needs. In this case, these immediate needs had already been met through the response from the community at large. Victims were being fed, clothed and sheltered by family, friends, hospitals, hotels, restaurants and numerous social services agencies throughout the city.

It was decided that the Edmonton centre should open on the statutory holiday, Monday, August 3, but that the centres in Leduc and Strathcona County would not open until August 4. The Edmonton and Strathcona County centres would be open for as long as they were needed while the Leduc centre would be open for only three days. A major press release was issued at about 1600 hours on August 2 listing all the services available at each centre.

A meeting was held at M.E. LaZerte at 1500 hours on August 2 to allocate space and discuss the operation. The community school co-ordinator led the group on a tour of the school. It was decided to keep everything on the main floor and space was allocated in a circle around the general office.

Visitors would enter by the main south entrance, where a reception desk manned by the Red Cross was established. Their names would be checked off against the list which the Red Cross had been assembling since Friday evening and they would then be guided to the information and referral service in the staff dining room behind the main cafeteria. The cafeteria provided seating where survivors could wait and where refreshments could be served throughout the day.

Canada Mortgage and Housing and Alberta Mortgage and Housing were located immediately outside the cafeteria. Next door was APSS Disaster Registration, which turned out to be the busiest office after information and referral.

Across the corridor, in a very large space with desks for individual interviews, was Alberta Social Services, Canada Employment and Immigration, and Health and Welfare Canada. Next to this was a meeting room for the centre staff, and next to it was a room used by Workmen's Compensation. This service wasn't heavily used and was later moved into the large room with Social Services.

The school's student counselling offices, with their counselling cubicles, were ideal for the health and counselling services offered by the City of Edmonton Board of Health in conjunction with Alberta Mental Health Services and the Psychologists Association of Alberta.

The volunteer agencies were also allocated space. The principle agency was the Salvation Army, which used two offices for interviews and provided points of contact for the Edmonton Food Bank and Emergency Relief

Services. When the centre opened, a Mennonite group, Christian Disaster Services, came in to offer their services and were provided with a desk and phone in the general office.

The main staff conference room provided desk space for the city and provincial co-ordinators and was used as the media conference room. Down the hall, the music room became a child care centre and the drama theatre was made available for a chapel.

It was decided that guides should be provided to help survivors. The guides, all volunteers directed by the Red Cross, would escort visitors from the reception area to information and referral and then on to other services as required. They would also patrol the hall to assist anyone who appeared to need help.

'edmonton telephones' set up phones for the operation on Sunday afternoon. All the rooms that would be used had internal phones connected to the school switchboard. Agencies which needed extra phones moved phones from unused classrooms. Two extra direct-out lines were installed, one for the Red Cross and one in the staff meeting room for the use of the co-ordinators. Red Cross volunteers operated the switchboard throughout the eight days that the centre was open.

The decision to open on the Monday holiday caused some agencies staffing problems, but personnel for all offices were at the school at 0800 hours ready to set up. Typewriters and one computer (for Alberta Social Services) were installed.

Representatives from all agencies met in the cafeteria at 0915 hours to confirm their readiness and describe the services they would offer. This was invaluable for the Edmonton Social Services staff in information and referral, but it also gave everyone in the centre an outline of all the services available and permitted a closer working atmosphere.

While the social services staff in information and referral and the public health and mental health staff in counselling were directly charged with counselling and emotional support, all the other agencies found they were, to a degree, also required to play the role of helpful listener. They offered suggestions for additional stops in the centre that had not been identified in the original referral.

The press release had announced that the centre would open at 1000 hours. People were lined up before 0930 hours, so the centre started operations a few minutes early. Approximately 220 family units were registered by 1500 hours.

The rushed opening on the holiday (instead of waiting for Tuesday like the other two centres) may have mitigated against a more organized approach. However, the initial not-quite-perfect atmosphere may have contributed to a feeling of informality which helped the victims. This

atmosphere was helped by the delightful young people (mostly Girl Guides and Boy Scouts) who acted as guides, and by the cafeteria and the child care room.

It is doubtful more time for organization would have improved the operation. A TV crew accompanied one of the first families in. Ninety minutes after registering at the Red Cross desk, this family left the centre having made contact with Disaster Registration and carrying a key to the apartment which was to be theirs for at least the next month. They carried a telephone for that apartment with them.

There was not much demand for counselling on the first day. The principal interest was in the basics of food, clothing and shelter. From the second day onward, the call for counselling increased.

Staff meetings were held at 1500 hours every day. Representatives from each agency attended and reported on the day's activities. This updated the co-ordinators, provided information for press releases and gave everyone a chance to hear more about what the others did. All agencies attested to the value of these meetings in their final reports.

The wisdom of seeking out a community school was borne out in the operation of this centre. The community school co-ordinator had access to all parts of the school, the authority to call in extra caretakers and the ability to foresee many needs before the staff was really aware of them. Her access to school facilities meant that a photocopier (between 15,000 and 20,000 sheets of paper were used) and a word processor were available for use. The latter was used to prepare a centre directory and information sheets for victims and to amend these as needed.

The M.E. LaZerte Victim Assistance Centre was open daily, including Saturday and Sunday, until Monday evening, August 10. Over the weekend, a newspaper reporter passed on a request from residents of Evergreen Mobile Home Park for a continuation of the centre, preferably in the park itself. APSS decided to open the busier agencies of the centre in the recreation building at Evergreen on Tuesday, August 11. City Social Services information and referral, Alberta Social Services, a public health nurse (counselling) and APSS operated at the park until Thursday, August 13. The Red Cross closed its desk Tuesday afternoon. The Salvation Army maintained its desk to provide contact with the volunteer agencies and to provide refreshments for the centre staff and victims. The busiest desk for the three days was that operated by APSS, with two registration officers working almost steadily throughout.

The Strathcona County centre: Salisbury Composite High School, Sherwood Park

The assistance centre in Strathcona County was set up to help employers and employees. The set up in Strathcona County, in the gymnasium of the Salisbury Composite High School, was different from the Edmonton one. Most of the agencies represented in the Edmonton centre were also found in Sherwood Park, but they were all located in a rough circle around the perimeter of the gym floor. Limited privacy was provided for some of the agencies through the use of portable screens. However, the general consensus of those who worked there was that it was too noisy and didn't provide the same atmosphere for the victims as did the setup in LaZerte. The first day of operation on Tuesday saw long lines snaking through the area as people waited to be interviewed. Confidential conversations were almost impossible.

The Strathcona County Victim Assistance Centre stayed open until Friday, August 14, but most of the agencies ceased their operations on August 7. At that point the centre, with county representatives and APSS Disaster Registration officers, moved to the library area in the county building.

The Leduc centre: Leduc County offices

The Victim Assistance Centre in Leduc was specifically aimed at residents of the County of Leduc and the area of Beaumont. It was located in the Leduc County offices, operated for three days (August 4-6) and only registered applications for disaster assistance under the APSS programs. A similar office was opened in Morinville the week of August 10 and APSS field service officers also registered requests for assistance in their regional offices.

While the Victim Assistance Centres all closed after two weeks, all the agencies continued to offer assistance from their regular offices. Registrations for disaster assistance were still being made at APSS in March 1988.

This advertisement was placed in local newspapers to inform tornado victims about the services available to help them.

TORNADO VICTIMS ASSISTANCE

The Victim Assistance Centre at M.E. LaZerte Composite High School, 6804 - 144 Avenue will CEASE operations on Monday, August 10, 1987 at 7:00 p.m.

Anyone still needing assistance after the Centre closes should contact the following agencies and organizations in Edmonton:

- **Disaster registration and enquiries:**
  Red Cross Society
  9931 - 106 Street, Phone 423-2680
- **Registration of losses and damages to personal, residential and commercial property:**
  Alberta Public Safety Services
  10320 - 146 Street,
  Phone 427-2772
- **Identification of immediate and longer term housing needs:**
  Canada Mortgage and Housing Corporation
  #200, 10216 - 124 Street,
  Phone 482-8700
  Alberta Mortgage and Housing Corporation
  9405 - 50 Street, Phone 468-3535
- **Clothing, furniture and appliance needs:**
  Salvation Army Family Services
  10441 - 123 Street
  Phone 488-0208
- **Food requirements:**
  Edmonton Food Bank
  Phone 425-4190
- **Emergency financial assistance:**
  Your nearest Alberta Social Services Office or, Alberta Social Services
  Crisis Service
  9945 - 107 Street, Phone 427-3390
- **Counselling and health concerns:**
  Your nearest health centre, or,
  Edmonton Board of Health
  Phone 482-1965
- **Water and sanitation problems, utility hookup and clean-up information:**
  City of Edmonton Water and Sanitation
  Phone 428-5145
- **Financial counselling:**
  Alberta Consumer and Corporate Affairs
  Phone 427-5782
- **Insurance information and assistance:**
  Insurance Bureau of Canada
  Phone 423-2212
- **Unemployment Insurance:**
  Your nearest Canada Employment Centre,
  or phone 420-2207
- **Workers' Compensation**
  9912 - 107 Street, phone 427-1100
- **Cheque distribution arrangements for Canada Pension, Old Age Security, Family Allowance, applications and information about survivor benefits:**
  Health and Welfare Canada,
  Income Security Program
  7th Floor, 10055 - 106 Street,
  Phone 420-2630

Alberta
GOVERNMENT OF ALBERTA

Disaster Social Services Program:

Alberta Municipalities

The Disaster Social Services (DSS) Branch of Alberta Public Safety Services (APSS) is responsible for assisting municipalities in developing a capability to respond to the needs of disaster victims (evacuees) by providing planning support and training for response management personnel. During an actual disaster or major emergency, DSS is expected to co-ordinate the Government of Alberta's social services response to municipal requests for government help.

The DSS Branch has prepared a Disaster Social Services Procedures manual which contains job descriptions for every position to be considered in delivering assistance to evacuees during a disaster/emergency. This manual also contains checklists which apply to every conceivable role in DSS delivery. These are designed to aid in mounting a response in the absence of a plan, as well as to assist in developing plans and procedures.

The DSS Branch was also involved in developing Annex "M" to the Government of Alberta Peacetime Emergency Operations Plan. This annex describes the "one-stop" concept which was put into place at the M.E. LaZerte School following the Edmonton tornado. In that document, municipal, provincial and federal resources necessary to respond to a major event were identified, along with a proposed organizational structure and a sample screening form to be used in processing evacuees. The idea for this concept was borrowed from a program developed by the U.S. National Institute of Mental Health in 1979. Although this document was still in the draft stage in Alberta, the concept worked extremely well. (Under the "one-stop" system, a number of different social services are co-ordinated in one location for the convenience of people affected by a disaster).

At a meeting held on August 2, two days after the tornado struck, the DSS Branch head outlined the organization described in Annex "M" to representatives from Alberta Social Services, Alberta Community and Occupational Health, Edmonton Board of Health, Salvation Army, Red Cross and Edmonton Social Services.

As described in the annex, two jurisdictions would work together. Municipal resources would be managed by a reception manager designated by the municipal director of social services. An APSS designate would co-ordinate the provincial/federal resource requirements. This would be a field services function, since that person would most likely have had the greatest visibility with the municipal planning committee. The role of the DSS Branch would be to co-ordinate Alberta Social Services and Alberta Community and Occupational Health support to Edmonton Social Services and to act in an advisory capacity for the municipal director of social services.

Outreach and debriefing support

The need for debriefing of rescue personnel and human service workers involved in disaster recovery operations was first identified in Alberta by the DSS Branch in 1983. This awareness came about as a result of continuing DSS research by the U.S. National Institute of Mental Health on stress following involvement in major natural disasters.

Following the Hinton, Alberta, rail disaster of February 8, 1986, the DSS Branch attempted to set up an outreach function for survivors and next of kin. Meetings with Community and Occupational Health (Mental Health Services Division) resulted in a co-operative attempt to provide support to the survivors and bereaved next of kin. As this had not been planned for prior to the derailment, entry was not entirely possible. Notwithstanding, some contact was made through the mental health clinics.

Subsequent to the rail disaster, a study was conducted of recovery personnel and bereaved next of kin. Conclusions and recommendations from this study identified a need for outreach and debriefing support. To this end, a Mental Health representative attended a workshop in New York City on Psychological Response in Disaster Emergencies. Following this workshop, there was considerable recognition of and support for outreach activities by Mental Health. To that end, the director of the Edmonton region was tasked to work with the DSS Branch in developing a support system.

In September of 1986, the DSS Branch head, the director of Edmonton Region, Mental Health Services, and the assistant executive director of Mental Health Services attended a course on Critical Incident Stress Debriefing (CISD) in Virginia.

In November 1986, the DSS Branch organized a two-day workshop on Psychological Response to Disasters. This workshop was attended by representatives from Mental Health Services and Alberta Social Services, as well as fire, police and ambulance personnel. At this workshop, the consensus was that APSS and Mental Health should embark on a CISD support system.

The 1987-88 DSS training program included lectures and audiovisual material on CISD. Permission was received from the National Institute of Mental Health to reproduce a training/procedures manual for human services personnel. The manual was provided to course candidates and Alberta Social Services and Community and Occupational Health personnel throughout the province. As well, the DSS Branch began conducting in-service workshops on Critical Incident Stress to the ambulance and fire services.

Following the Edmonton tornado, the DSS Branch offered its services as a disaster specialist to Alberta Social Services, Community and Occupational Health, Edmonton Social Services and Edmonton Board of Health. All Branch-held information such as course handout materials, video training aids and overheads on victim/incident stress was made available through the Personal Services Co-ordinator, Edmonton Board of Health.

During the tornado activities, the DSS Branch provided victim stress information packages for staff review and handout material related to victim stress issues for use by Alberta Community and Occupational Health and Edmonton Board of Health.

In the weeks following the tornado, to support predicted outreach requirements, the DSS Branch provided Edmonton Board of Health and Alberta Community and Occupational Health with 5,500 copies of a brochure "Coping with Children's Reactions to a Disaster" and the "Tornado Colouring Book". The former was designed to assist parents in understanding child behavior following an event such as a tornado. The latter has been found to be an excellent tool for getting children, in an abstract, indirect way to express their fears, feelings and thoughts. This material had been prepared in the United States. The DSS Branch discovered it several years ago and secured permission to reproduce it.

Edmonton Board of Health

The following is an edited version of an article that appeared in the Canadian Journal of Public Health under the bylines of Katherine Cormie, MEd; Joy Edwards, MSN; James Howell, MD, FRCPC; Darlene Jones, BScN; Karen Mills, MHSA; and Helen Ready, MHSA. The article details the long-term mental health follow-up of those affected by the tornado.

Although the tornado first struck at 1500 hours, it was not until 1725 hours that it was confirmed that a representative from the Edmonton Board of Health (EBH) should report to the Emergency Operations Centre (EOC) at City Hall. The deputy medical officer of health (MOH) arrived at the EOC at 1745 hours and established contact with the senior deputy MOH, who was to co-ordinate the EBH response. Key members of the Disaster Committee (the directors of nursing, environmental health and research/planning) assembled in the EBH board room.

The MOH arrived at the board room at 1840 hours, was briefed and later relieved the deputy MOH at City Hall. Also present in the EOC was the assistant deputy minister, Alberta Community and Occupational Health, representing Leduc-Strathcona Health Unit. There was, therefore, an opportunity to discuss the need for various forms of joint action, prominent among which were ensuring the safety of water supplies, occupational health inspection of damaged industrial buildings, and the desirability of providing mental health counselling for distressed families and workers.

It was agreed the ambulance personnel had suffered heavy strain and were vulnerable to emotional breakdown. One public health nurse and one mental health consultant from Alberta Regional Mental Health Services were dispatched to ambulance headquarters to assist staff as they came off duty. Subsequently, group sessions were arranged for each of the four squads.

The day after the tornado, police set up a reception centre for displaced residents of the Evergreen Mobile Home Park. Shifts of three nurses were provided at the reception centre and at the mobile home park to make contact with the victims; this proved to be a valuable service. Two doctors completing their residency in psychiatry at the University Hospital and two social workers from the Red Cross also attended at the Londonderry Inn, which had accepted many survivors.

Alberta Public Safety Services called a meeting on August 2 at which the MOH and the deputy minister supported the concept of a single service centre. Called the Victim Assistance Centre, it was set up in M.E. LaZerte Composite High School. An EBH nursing supervisor was assigned to head the health and counselling section, for which the EBH was to be administratively responsible. Negotiations resulted in EBH being allotted the educational counselling centre in the school, and this proved admirable for the services made available. A pleasant, quiet and sensitive environment was essential. Teams consisted at most times of public health nurses, regional mental health consultants, and psychologists volunteered by the Alberta Psychologists Association.

This centre opened on August 3 and continued until August 10. Group sessions were also convened for survivors and for employees of other city

departments. This service to city employees unfortunately collapsed when, because of some misunderstanding in oral communication, the workers failed to make contact with the therapists. (An apology was received from the city's manager of personnel.)

Attendance at the health and counselling service at the centre totalled 113 families (190 individuals) over the eight days of operation.

Liaison with other agencies was maintained through daily meetings called by the centre manager. On the final day a formal meeting was called by the MOH in co-operation with Edmonton Social Services to formalize the arrangements for medium- and long-term follow-up. Training needs were discussed, resources catalogued, outreach and arrangements for further counselling confirmed, and responsibilities defined.

A news release described the process of psychological recovery after a disaster, and arrangements were made for EBH staff and psychologists from other agencies to appear on the media. Material was prepared for teachers describing the expected emotional impact of the tornado on children.

The health and couselling service was transferred to the Evergreen Mobile Home Park when the Victim Assistance Centre was closed. It remained open at the park for three days, during which five families (eight individuals) were seen.

Follow-up

In recognition of the importance of gaining the best possible information and advice regarding the ongoing tornado response, workshops were arranged on August 27-28 for staff of all agencies involved in disaster response. Speakers with expertise in disaster response were brought in from Barrie, Ontario, California, and Virginia, and their expenses were paid by the Edmonton United Way. Some 165 staff members representing 38 different agencies attended one or more of the five workshops and reported finding them useful.

A long-term (12-month) plan to follow up the cohort of persons exposed to the tornado in order to mitigate emotional effects and to document the stages of recovery was set in place. The Canadian Red Cross provided a list of those who registered for help. Plotting these people on a census district map identified the vulnerable areas. Public health nurses made contact with those who had, as well as those who had not, expressed individual needs. Families in the affected areas were visited door-to-door and survivors whose homes were destroyed were located through referral and cross-referencing with other agencies and organizations. Thus, the majority of people affected were identified. The nurses assessed families;

provided support, counselling, education, and information regarding community and other resources; and referred as necessary to other agencies.

The long-range plan for outreach was to contact all survivors again at three months, six months, and one year after the disaster unless closer follow-up was indicated. This outreach schedule is similar to the one followed in Barrie, Ontario, in response to the tornado in May 1985.

The first follow-up time (November-December) was chosen so that nurses could assess and assist families during a difficult time for the survivors. The families, stressed and frustrated with trying to re-establish their homes, dealt with many agencies and companies, sometimes not progressing the way they thought they should. They might experience further stress related to the Christmas season when they could be facing traditional celebrations in the presence of loss.

The second time frame (March-April 1988) was chosen to check on families' progress and to again provide anticipatory guidance as to delayed stress reactions, possible fear reactions to weather and summer storms, and how to develop personal plans in case of disaster.

During the third round of visiting (July 1988) the nurses would again be reassessing and providing assistance and anticipatory guidance for the emotional impact of the anniversary of the disaster, terminating routine follow-up and ensuring that families know how to access services if required in the future.

The nurses made initial contact with 747 families (700 of them in Clareview). Many families received more than the initial contact when nurses identified them as requiring more frequent follow-up. The average time taken for these visits was 50 to 60 minutes. The nurses were very well received. They reported that the majority of clients had experienced some stress reactions ranging from sleeping and eating disturbances to fears and depressions. Generally, families were coping well, but needed to be able to talk about their reactions and situations, get information on how to handle their stress, be reassured that stress is normal, and know where to seek assistance if they needed it. Children were a major concern: many were demonstrating behavioral changes and parents required advice and reinforcement in dealing with them. For some families the stress had precipitated marital problems and exacerbated previous problems. Clients requiring in-depth treatment counselling were referred to Alberta Mental Health Services and other agencies providing these services.

More specific information regarding follow-up visiting and referrals is available from EBH in year-end summary sheets designed to facilitate data collection. A summary of nursing time expenditure on tornado-related activities is also available.

Other forms of public health intervention were directed to identifying groups within the various communities where a health mutual support process could begin. Community development processes were initiated at Evergreen Mobile Home Park and in two other neighborhoods with the potential to restore or even improve on pre-existing structures and attitudes. Adult and child support groups were convened in two areas; teen and seniors groups were offered in Evergreen; and an adult group was held at Alberta Mental Health Services. Edmonton Social Services took the responsibility of providing consultation to these groups, but EBH involvement was maintained.

Response to the business community

The role of the EBH in response to the business community was less direct. In the two weeks immediately after the tornado, information sessions were given to the employees at a steel manufacturing plant as to what services were available. Copies of the brochure "Coping With a Major Personal Crisis" were sent to the owners/managers of all 135 businesses registered at Disaster Services. They were accompanied by a covering letter describing services available. Several owners called asking for more copies.

Four weeks after the tornado, the United Way contacted the businesses affected to determine their needs and found that all were still operational in one form or another and that most were still very active in clean-up and re-establishing themselves. Alberta Mental Health staff conducted debriefing sessions for companies that requested it for their employees. They hired three additional therapists to work specifically with disaster victims. Part of their responsibility was to personally contact all of the business owners and offer outreach counselling for those having difficulty.

Immediately after the tornado, EBH staff were very active with the media; they provided interviews on radio and television and background information for newspaper articles. An interagency committee composed of representatives from EBH, Edmonton Social Services, and Alberta Mental Health met to develop long-term plans. The committee identified several information issues that would need to be communicated to different target groups over the next year. Strategies for achieving these were developed. The United Way provided funding to hire an editor and produce a newsletter to inform those working with tornado victims of predictable difficulties, changes in service, and new programs.

Health and Welfare Canada expressed interest in conducting an epidemiological study of physical injuries resulting from the disaster. Their proposal was approved by the EBH Research Review Committee, and

assistance in data collection was promised. This study is similar to the one conducted following the tornado in Barrie, Ontario.

Recommendations

1) That the City of Edmonton be advised to review its initial call-out procedure in an emergency to ensure that all city departments and outside agencies, including the EBH, are contacted as members of the Emergency Planning Committee.
2) That within the EBH representatives of all divisions report to headquarters, regardless of the nature of the disaster.
3) That an emergency contact list be maintained, including the names and home phone numbers of all management committee members. The list should be updated and distributed with any change of name or phone number.
4) That the switchboard be activated during a major disaster to handle all incoming calls. This would require clerical staff to man the phones if deemed necessary.
5) That the following equipment be purchased for use by EBH staff in a disaster response:
   - battery-operated radios for the boardroom as well as all health centres and some two-way radios if practical
   - a large map of Edmonton for the boardroom indicating residential areas and industrial/commercial areas of the city
   - twenty magnetic car door signs for field staff to ease their access to restricted areas
   - a minor first-aid kit for 50 casualties, held in stock at the main office, for use by the nursing division at the designated evacuation centres
6) That a standardized recording form be used by all EBH staff responding to a disaster. This should be included as part of the EBH Emergency Procedures Manual. That EBH staff should keep an accurate record of time spent in a disaster response.
7) That regular training in first aid be made available to EBH staff who are required to provide first aid in a disaster.
8) That EBH suggest to all city hospitals that they incorporate into their disaster plan an arrangement with the Edmonton Home Care Program to assist them in emptying hospital beds in a large emergency situation.
9) That the EBH, as a priority, devote resources to the follow-up of the cohort of Edmontonians who were exposed to and survived the tornado, with special attention to the children.
10) That training in the handling of disaster victims' emotional responses, both during the initial phase of the disaster and the long-term follow-up, be provided for all EBH staff involved with disaster victims.

11) That the major agencies providing long-term emotional support for disaster victims (EGH, Edmonton Social Services and Alberta Mental Health Services) further co-ordinate their disaster plans and clarify their roles.
12) That during a disaster and for the long-term follow-up of the victims, the EBH play a co-ordinating role in responding to mental health issues.
13) That the EBH advocate that debriefing of emergency rescue personnel, and other groups as appropriate, be a routine procedure for their respective agencies. That debriefing and ongoing support be provided by an appropriate mechanism to EBH staff involved in aiding disaster victims.
14) That the EBH act as a facilitator to encourage other agencies to initiate education for the public in how best to protect themselves during a tornado and other types of disaster. It is suggested that public education for protection against tornadoes take place in the near future.
15) That opportunities which arise for research into the effects of disasters be taken advantage of whenever possible.

The following is an edited version of an EBH report on the first (November-December 1987) series of planned public health nursing follow-up activities.

Some 1,180 families were contacted by home visit, phone call or letter. Of these, 80 to 85 percent received a visit or a phone call. There remained 26 individuals or families from the Evergreen Mobile Home Park that could not be located despite repeated efforts.

The majority of families was progressing well with recovery. However, there was still a great deal of nervousness and apprehension in the Clareview community about the weather and anticipated storms. During one weekend in February when there were high winds, a great many people left the park to stay with relatives or friends or in hotels; some Clareview residents of houses spent the weekend in their basements.

Subsequent to the November-December round of visiting, however, it was decided that since the great majority of individuals was coping well, the plan for two more rounds of visiting (in March-April and July) should be revised to plan only one more round in May-June, with a mail-out to all families in March.

There were a number of instances where the effects of the tornado were devastating and problems remained ongoing and unresolved. These include:

- A family wherein the husband was seriously injured when his car was destroyed on the highway. He remained physically unwell, seriously

depressed and found it difficult to obtain and hold employment.

- An immigrant woman with two young children was seriously injured and her husband was killed on Sherwood Park Freeway. She remained severely physically impaired and there was great difficulty in obtaining financial assistance for her.
- A young teen who sustained serious injury was angry that he could no longer play hockey or participate in similar activities and was demonstrating his anger in acting out behavior.

Some 32 families were referred to the Stress Management Program at Alberta Mental Health Services.

Other families who already had psychological/marital problems before the disaster found these intensified. A number of families of the dead and injured moved away from their communities and could not be traced.

Close co-operation continued between public health nursing staff and other community agencies. Some of the ongoing activities were documented in the January 1988 issue of the Tornado Response Newsletter (a joint project of EBH, Edmonton Social Services and the Edmonton region of Alberta Mental Health Services).

Meetings with representatives from three affected schools discussed concerns and made plans to support the children and address any problems.

A spring storms information session in the Clareview area, co-sponsored with Edmonton Social Services, was planned for April.

The Youth Project, co-ordinated by a public health nurse, a social worker from Edmonton Social Services, and a community advisory committee, continued to function. Two youth workers were hired to work with the young people in the community. There were both teen and pre-teen groups in the Evergreen and Fraser-Bannerman districts.

In conjunction with Health and Welfare Canada, the EBH commenced an epidemiological study of physical injuries and deaths resulting from the disaster. By comparing circumstances of those people caught in the path of this tornado, we hope to find ways of preventing injury or death should another similar disaster occur. Approximately 300 people who were involved in the tornado were to be contacted. Seven nurses were hired to conduct the interviews.

In the course of contacting injured victims for this study through hospital information, a number of families who had not previously been contacted through our established mechanisms were located and became available for follow-up for the first time. This would seem to highlight the inadequacy of the hospital-community referral link, which probably becomes even more inadequate under emergency circumstances.

Victim Services – Voluntary Sector

8

Canadian Red Cross Society, Alberta-N.W.T. Division

Shortly after 1600 hours on Friday, July 31, Edmonton Branch activated emergency measures in response to the tornado. Contact was made with the local media; the message was concise — Red Cross was ready to assist.

As the branch office telephone number was broadcast throughout the city (and country), the 10-line rotary phone service in the office was overwhelmed with calls. Initial calls were from concerned people, mostly women and children, who had heard the warning about the second tornado and had turned to Red Cross for help and advice. The phone lines were then flooded with concerned citizens calling to volunteer their assistance. When they were not able to place the call into the Edmonton Branch, they began to line up outside Red Cross House. In all, more than 1,300 volunteers were registered.

Within an hour of the storm, the Edmonton Red Cross Branch became a central co-ordinating site for the provision of emergency social services response to the disaster.

During the tornado response, the Red Cross emergency response team in Edmonton consisted of more than 650 volunteers and staff. The team processed more than 11,000 victim welfare inquiries, successfully matched over 5,000 tracings, procured and distributed food and beverages to more than 600 emergency relief workers for one full week, co-ordinated temporary housing for 89 displaced families in the immediate aftermath of the disaster, and provided assistance at M.E. LaZerte Composite High School in Edmonton, a Victim Assistance Centre where 842 families received various forms of social assistance. In addition, some 80 corporate donors provided food, clerical assistance, equipment and hotel accommodations.

While agencies of the provincial and municipal governments assumed responsibility for the long-term care of victims, Red Cross was continually asked to solve immediate problems as they occurred. Red Cross workers became "fixers", constantly finding ways to provide for the needs of the hundreds of people victimized by the tornado.

Volunteer activity

Soon after the initial offers of help, calls of inquiry began, and with them began the process of information gathering and recording.

Red Cross workers had been requested by city officials to provide registration and inquiry services at a pre-designated high school. However, people displaced from their homes did not proceed to the reception centre. They went instead to hotels in the most severely affected quadrant of the city.

Registration teams were sent to the hotels that had taken in tornado

victims to establish a registration process. Volunteer couriers regularly transported the information back to Red Cross House, where the central registry was set up.The mobile registration teams worked through the night. It was 2300 hours, August 1, before all families had been assigned and transported to accommodation and the mobile registration operation could be shut down.

Communication problems became evident as, over the initial 24-hour period, the fatality list was revised from 45 to 26. Red Cross contact with local hospitals indicated 253 admissions, of which 192 were treated and released and 61 needed extensive treatment. Of the 61, one was to die in hospital.

It was recognized early in the same 24-hour period that the existing 10-line rotary telephone system was not adequate. Calls were coming in at a rate of nearly 300 per hour. Alberta Government Telephones installed eight more lines (all that the system could handle), leaving two designated lines for the command centre. Although it took considerably more time to install, a telefax system was also put into place. Amateur radio operators established communications with Winnipeg and Vancouver on the day following the tornado and began accepting inquiries via radio.

To alleviate inevitable worker burnout, shifts were co-ordinated through the volunteer resources consultant. Shift workers were assigned tasks ranging from registration and inquiry processing to the procurement and distribution of food and beverages. Approximately 600 volunteers and staff handled these tasks.

Initially, it was considered that on-site volunteer training would be handled in a group orientation. This evolved to a system whereby the person coming on shift would be assigned to an individual coming off shift. A half-hour time overlap allowed ample opportunity for information exchange and eliminated the problem of continual group orientations.

An area of concern that developed was the enormous emotional toll on volunteers faced with calls from thousands of distraught individuals. When it became apparent that someone was experiencing problems, floor or area supervisors would take over the call until the original volunteer could begin again or be replaced by another volunteer.

On Monday morning, August 3, less than 65 hours after the onset of the disaster, the tornado Victim Assistance Centre was opened at M.E. LaZerte High School using a one-stop approach. This allowed people to congregate, register loss of personal property, obtain immediate and long-term housing assistance, take care of clothing, food, and special financial needs, and have access to stress counselling, all under one roof.

Each day, 60 Red Cross volunteers were involved with the operation on two rotating shifts. The volunteers were involved with everything from

registration and reception services to supplying juice and toys for children. Red Cross volunteers would greet people as they came in the doors and stay with them until it was ascertained that they had been able to address all their questions. A "neighbor system" was set up to give the affected people someone to talk to while waiting.

There was a perception among the other response agencies that Red Cross could do everything. There was no worry about coping with events. There were so many volunteered resources, both material and human, that Red Cross workers felt they could indeed handle all challenges. Before the week was out, those tasks outside of emergency services created an onerous work load for the Red Cross volunteers.

Recognizing that some forum for emotional support was necessary, the Red Cross invited provincial government mental health personnel to conduct four psychological debriefing sessions for Red Cross volunteers and staff involved in the tornado. Fifty-five people participated in one of these sessions and the feedback was excellent.

Conclusion

A major reason for the success of the Red Cross response to the tornado in Edmonton is the fact that it is a voluntary organization. It is capable of flexibility and growth within, which is essential in responding to the needs of the situation. Without a doubt, Red Cross provides an element that professional (paid) response services cannot. To hamper our effectiveness with overly restrictive policies and procedures would be a disservice to the volunteers whose sole interest is relieving human misery.

Each disaster/emergency brings with it dynamics that rule out a point-by-point planning concept. Emergency planning, by its very nature, must be extremely flexible — comprehensive, yet able to adapt to the changing/growing needs inherent in an emergency situation.

Recommendations

1) General job descriptions should be developed. These descriptions must apply in any number of emergency situations and, as such, require extreme flexibility. Examples would be:

   Typist/photocopier; switchboard operator; facsimile operator; runners for dissemination of updated information to appropriate individuals; and a floater to look after the needs of in-house workers (food/beverages, etc.) The needs of field operators could be addressed as well by a floater.

2) With respect to supervisory roles, job descriptions (again flexible) should be developed and implemented as need warrants. An example of a response management team follows:

   - Director, Disaster Services, supported by
   - Deputy Director (2). In this manner, direction is provided on a 24-hour basis.
   - Co-ordinator, Volunteer and Support Services, to provide
     - community group liaison, i.e. Salvation Army, snowmobile clubs
     - volunteer shift recruitment/scheduling
   - Field Operations Chief
   - Communications Chief, for
     - media liaison
     - external and internal communications
   - Registration and Inquiry Chief
     - with various area supervisors
   - Ham Radio Chief
   - Procurement Chief, for
     - food and beverages
     - resources as required
     - supervising floater

3) A small core of volunteers and staff needs to be well trained in emergency social services response to all levels of disaster. This group of trained individuals will have the leadership skills, the knowledge and the capacity to train others. They will then work with teams of volunteers to handle various aspects of the event.
4) Accurate records of volunteer involvement are a must. Addresses, telephone numbers, work area and hours of involvement are essential for post-disaster contact.
5) A log must be implemented immediately for the recording of major decisions and events. This is a valuable method of information transmission between shifts and is very useful in operational debriefings.
6) It is essential that anyone involved in any way be given guidance in the types of emotional reactions to expect both from those around them and from themselves.
7) A timeline for post-disaster psychological and operational debriefings should be predetermined and strictly adhered to. The opportunity to attend a debriefing session must be a part of any disaster response plan.
8) The use of ham radio groups would further enhance communication. A permanent antenna should be installed on the roof of each staffed

Red Cross branch building. Communication links, when necessary, between emergency response teams at the disaster scene and the branch should take advantage of mobile radio units manned by volunteers from the local radio group. Additional facilities could be put in place, up to the installation of a complete station, available for immediate use in the division and staffed branches to expedite the accurate flow of information. A relationship must be developed and maintained between Red Cross and local radio groups.

9) Emergency plans should (wherever possible) designate the area of the building to be used as central registry. Consideration should include a separate conference area for the director and management team with designated phone lines in place or immediately attainable. Other considerations are photocopying, adequate numbers of phones for volunteers, washrooms, a quiet area for workers to go to and accessibility to facsimile and ham radio hookups.
10) Counselling professionals must accompany the Red Cross mobile registration and inquiry team. Immediate response to the victims' needs in this area is essential.
11) Red Cross workers must be aware of and mature enough to recognize undue distress in victims who might require immediate services from health and counselling professions.
12) Pre-liaison with city officials and police/fire departments is essential so that, in the event of a disaster, an on-site Red Cross volunteer can establish as quickly as possible the affected areas. This will greatly enhance the ability of workers at Red Cross House to forestall the huge numbers of out-of-town inquiries about people in unaffected areas.
13) Computer programs are being developed to assist in the prompt and accurate recording of registrations and the search and reply to inquiries. As details become available, staffed branches should incorporate the programs into approved management systems.
14) Dependency on electric power for office equipment, lights, radios and computer use dictates that arrangements for standby emergency electric generators should be included as part of the overall plan for the central registry.

The Salvation Army

As soon as the call from the City of Edmonton's disaster committee was received, a Salvation Army command post was set up at the Army's Sunset Lodge for seniors in the city's north end. The divisional commander immediately rallied her officers and lay personnel to co-ordinate relief efforts and commence emergency food preparation.

A team of 18 officers was dispatched to the Evergreen Mobile Home Park, the hardest hit area of the city, to offer comfort, counselling and prayer to the many victims in the area. An urgent need for food and refreshment for victims, relatives, police and rescue workers was immediately met. Salvation Army personnel continued this feeding service on a 24-hour basis for the next 11 days. A mobile unit was pressed into service at the Strathcona County industrial area where firemen, workers and city utility crews were working hard to close down gas lines, seek out toxic leakages and search for victims.

At Evergreen, the canteen services continued as donations of food and beverages flowed in from restaurants, fast food outlets and concerned individuals. This enabled the Army to continue to provide for victims, police and rescue workers on site. About 1,500 meals per day were served, as well as countless snacks and beverages, but most important, distraught people had a source of comfort and a compassionate listening ear.

A temporary morgue was set up at Evergreen and here again the Army officers on the scene gave moral and spiritual support. Two mobile home units were loaned to the Army for private counselling.

Three Salvation Army warehouses were opened to receive donations of clothing, furniture and appliances, and a very generous public responded. As victims were relocated, our trucks delivered the items required to re-establish families. At one time we had seven trucks on the road picking up and delivering donated items — two from the military, two from The Salvation Army Men's Social Centre, two from Tilden (car rental), and one from a General Motors dealership. Two truckloads of bedding, dressers and mattresses were shipped from Calgary and Lethbridge Salvation Army Centres. Salvation Army personnel from Calgary, Red Deer, Wetaskiwin, Fort McMurray and Lloydminster arrived to assist as required.

An additional feeding station was requested by authorities to provide for the Mennonite volunteers who were searching through the rubble for personal possessions and valuables. This station was operated for three days on a 24-hour basis.

A Victim Assistance Centre was initiated at the M.E. LaZerte Composite High School, where all helping agencies were set up together for the convenience of tornado victims. The Salvation Army served as the official co-ordinators for the distribution of food, furniture and clothing. Salvation Army personnel met the families, interviewed them, assessed their needs,

and directed them to the appropriate agencies. Some of the victims were therefore meeting The Salvation Army for the second or third time and all were assured they could return again if future need warranted.

Pastoral counselling and hospital visitation was also provided by experienced Salvation Army officers to many of the injured in the city's hospitals.

Canada Safeway Limited made available $50,000 in grocery food vouchers to be distributed by the Army for the tornado victims.

At a memorial service held in Evergreen Mobile Home Park, The Salvation Army's Edmonton Temple Band provided music for the very moving service of remembrance.

In summary, some 210 Salvation Army officers and volunteers were involved over the 11-day period following the disaster. The Army:

- served in excess of 16,000 full meals
- counselled and prayed with 630 people
- distributed $50,000 worth of Safeway food vouchers
- supplied furniture to 87 families
- supplied clothing and bedding to 400 families

Edmonton Emergency Relief Services Society

This is an edited version of an audiotaped report submitted by Heather Airth, director of the Edmonton Emergency Relief Services Society.

The Edmonton Emergency Relief Services Society is a registered charity organized in October 1986 and incorporated in March 1987 to assist families in crisis. The organization has five directors, four of whom work on a daily basis at the society in donated warehouse space. The fifth is a firefighter who comes in to assist whenever he can.

On the afternoon of the tornado I was working at our warehouse. When we realized a disaster had occurred, I immediately called my colleagues. We had a short conference call and decided "damn the torpedoes, full speed ahead".

The marvelous thing about our organization is that we're very small, very dedicated and not encumbered by rules or policies we have to follow. We just got together on a conference call and said: "Yes, let's do it." We had no idea at that time what "it" might be.

I called Alberta Public Safety Services and told them who we were and that we had a warehouse with clothing, furniture and household items available and that we also would be accepting donations to be held in trust and turned over to families in need. They said: "Thank God." We also called the media.

In a short time our phone started ringing off the hook. Meanwhile, water was pouring in and we were trying to move our supplies and mop up to prevent water damage. We began receiving donations from people arriving at our front door even before they were told it was safe to drive again.

During the next hour the other directors arrived. Next began what was probably the longest 48 hours of our lives. When it was declared safe to drive, it was as if floodgates had opened up. People lined up at our door...people who came to help...people who came with donations.

We occupied about 5,000 square feet of donated warehouse space. By 2200 hours donations were piled up to the six-foot level and covered most of the floor space. We had to take down the temporary walls and expand into the other 90,000 square feet. At about 0200 hours on Saturday, we had 50 volunteers inside sorting the donations that were being constantly delivered. People were lined up in the rain 20 deep bringing donations in. The volunteers ranged from teenagers to senior citizens. Some stayed 24 to 36 hours. We didn't shut down until Sunday at midnight when we couldn't handle it any more and had to go home to get two or three hours of sleep.

On Saturday it was still raining outside but marvelous things were happening inside the warehouse. People kept arriving to help. The large parking lot beside the warehouse was full and cars were parked for a block on either side. A hundred more cars had commandeered the park opposite the warehouse. People who came in didn't look around for direction. They just looked around, saw what needed to be done and did it. They were probably the savviest group of volunteers that could ever be assembled.

One fellow realized there was a lot of perishable food coming in, so he went home and came back with his freezer. Another asked if he could call Safeway to get some refrigerated trucks. It was a beautiful meshing of people and ideas combining with work that had to be done.

By noon there was no place to park for people coming with donations. There were two lanes of cars lined up for a couple of blocks in either direction. A relay team was set up. They had shopping carts, and runners ran back and forth carrying donations from the parking lot to the warehouse. By afternoon we realized there was no room left to stack anything. The mayor arrived and arranged for an old airplane hangar to be made available to us. We decided to split up and operate two warehouses. The first would function as a distribution centre and initial starting point. The hangar would become the major drop-off point, especially for furniture and larger items.

A lot of social workers came by and offered to help. We welcomed them with open arms. Because our organization is so loose and so flexible, we had very few rules. The only rule we really had was when you were dealing with these people who had been through so much, you started with a hug and went from there. They needed something substantial to hang onto. There was a whole lot of hugging going on.

After the hug, a very minimal amount of paperwork was completed and the families, with support and help from the volunteers, went through the warehouse to assemble clothing, bedding and personal items. We wrote up huge grocery orders for them and then they went on to the hangar when they were ready to pick out furniture and big items. The items in the hangar were all sorted into boxes and labelled.

Throughout the weekend there was an enormous number of people who pitched in to help. On Sunday afternoon the Mayor's Office asked for a head count so they could send food for the volunteers. At 1400 hours we had over 500 people working. We had over 10,000 names in all on our assignment sheets for August and some are still with us.

Families really started coming in on Monday, starting in a slow trickle and then becoming a torrent. Throughout August we saw over 1,700 people. Donations continued to come in from all over Alberta and also from Saskatchewan and Manitoba. Parcels arrived from the United States and we had parcels and money arrive from overseas. It seemed people couldn't do enough to help.

On Tuesday, volunteer help was not as readily available as people went back to work after the holiday long weekend, but the donations still came in. By week's end, they filled the hangar and we got the use of more space from the city in an old bus barn. Throughout the week, donations arrived from farther and farther afield. Sometimes there was a three-hour wait to

unload the semis, the line was so long. The hangar was getting stacked to the 15-to-20-foot level. It was filling so quickly it was unbelievable. Donations continued throughout August. We filled 200,000 square feet of warehouse space, in most cases stacked 10 to 12 feet high. We collected over a quarter of a million dollars. Some was disbursed to families as emergency funds and the rest was merged with the Red Cross fund.

Conclusions and recommendations

To summarize what I think is important:

Our organization is comprised of very dedicated people who care very much and very deeply for what we do. None of us has a Master's degree or PhD. We are just caring people.

Our organization is very flexible. It is not hampered by rules, regulations, bureaucracy or red tape. I think that was important to the people who came. They were frightened, confused, in shock. So much had happened to them and they had lost so much so fast. We had just two rules (these were hard for social workers who were used to going by the book):

1) Start with a hug.
2) Make damn sure these families have enough.

There was a universal look in the victims' eyes..."lost" is the only way to describe it. They were so fragile, they really needed the flexibility, looseness and lack of bureaucratic red tape. We kept the paperwork to a minimum. After going through the Victim Assistance Centre at M.E. LaZerte, people came in and said, "If I have to fill in another form I'm going to scream." We tried to put families at ease and make it as comfortable as we could and to keep their running around to a minimum. (Our warehouses were just a couple of blocks apart.) I would fight to keep everything as centrally located as possible.

As for volunteers, we found if you give them their head and watch closely, you can pick out the leaders and assign them their area or large project, then things will mesh beautifully.

We have a loose disaster plan, but we know what has to be done. We managed as we did because we didn't know what was ahead of us, but we weren't afraid to try anything. We just looked, saw what had to be done and did it. Later I was asked to speak at a Mensa meeting. One of the members, who had volunteered with us, said there was no way these people should have been able to do what they did. I said we were too dumb to know we couldn't do it, so we just rolled up our sleeves and went to work.

There's one thing I would really like to see happen. We are part of the City of Edmonton and the Red Cross disaster plans. There are a lot of components to these plans and I would like to see all the components get together now (not after a tornado or a flood when all hell is breaking loose, but now) to exchange thoughts and ideas and get to know where each fits into the overall scheme. That way, in case of another disaster, we'll already have these things worked out and we'll know each other and everyone's role in the overall plan, and we'll feel comfortable calling each other.

I think it's a mistake these plans were made without getting in touch with the agencies making up the plan for input. They just let us know we'd be part of the plan. I think the people who work in the frontlines should be asked to contribute to the overall plan. We're the ones in the trenches dispensing the teddy bears and the hugs and walking clients back and forth because they're riding the edge and really need you to help them.

Edmonton Food Bank

By Brian Bechtel, Director

The Edmonton Food Bank is a volunteer agency which collects and distributes food to aid those in need.

Edmonton's Food Bank became involved with the tornado relief effort on the day following the disaster. Because the weekend of August 1-3 coincided with the Food Bank's annual Heritage Days food drive, staff and volunteers were on duty and were available to react quickly.

When it became apparent through media reports and inquiries at the warehouse that Edmontonians were including food items in their donations for the victims, it was obvious that there was a role for the Food Bank to play in the relief effort because of two reasons: our experience and expertise in collecting and distributing food and our possession of a facility specifically designed to handle food storage and movement. On Sunday, August 2, Food Bank representatives attended a meeting with other government and volunteer relief agencies where our specific role in the effort was determined. The program for collection and distribution which was set up over the course of Saturday and Sunday was implemented on Monday, August 3.

The Food Bank operates on a centralized clearing house principle, collecting food from a network of depots and distributing it through numerous affiliated church and community-based agencies. Individual hampers are constructed at the Food Bank's warehouse, while client intake and assessment, along with hamper distribution, occurs at the agency level. Except for a number of procedural and operational variations introduced to provide special service to victims of the disaster, the existing system was simply extended to include a new "agency".

In conjunction with The Salvation Army and the Edmonton Emergency Relief Services, intake and assessment was performed at the M.E. LaZerte Victim Assistance Centre. A special referral form was designed for this purpose and a Food Bank representative was placed on location to assist in the referral process. For the period of August 3-12, both the collection and distribution components of Food Bank operations were extended from 1600 hours to 2100 hours, Monday to Friday, and the Food Bank was open from 1200 hours to 1700 hours on Saturdays and Sundays.

Beginning August 6, six temporary staff positions were created and filled because of the extended operating hours, the additional work load created by the necessity of accepting donations of clothing and furniture and extra food donations, and the demands placed on volunteers and staff by the volume of donations associated with the Heritage Days food drive. Written internal policies and procedures were established to delineate and govern the duties of the temporary personnel. The costs incurred by this need for temporary staff and by the overtime required of permanent employees were reimbursed later by the United Way from a fund specifically set up for such purposes.

Because of the desire to provide special service to tornado victims in

order to minimize stress in what was an already very stressful situation, the tornado victim program was given special status and attention at the main warehouse. A co-ordinator was hired to oversee all aspects of the program. Hamper room procedures were altered from the standard "first come, first served" basis by assigning staff and volunteers to deal exclusively with the construction of hampers for tornado victims. Since many of the victims had lost everything in the disaster, every effort was made to provide more comprehensive and varied hampers than usual, and special needs were met whenever possible. The size of individual hampers was increased to provide food for seven days rather than the usual three to five days. Except when delivery was deemed absolutely necessary, standard procedures were followed and hampers were picked up at the main Food Bank warehouse. The assigning of specific tornado hamper makers began immediately and continued through the end of August, at which time the program was integrated into standard operations.

Conclusion and recommendations

The plan and procedures implemented by the Food Bank in conjunction with The Salvation Army were both efficient and effective in terms of collecting donated food and distributing it to disaster victims. Over the course of the program, 12,243.6 kilograms/27,000 pounds of food were distributed in 274 individual hampers. In essence, our response to this disaster involved little more than the addition of another "agency" requiring specialized service and the allocation of extra resources to provide the additional service. If similar emergency circumstances arise in the future and donated food needs to be collected and distributed, we recommend that our expertise in this area once again be utilized to ensure the orderly handling of foodstuffs.

Mennonite Groups

Two Mennonite groups, Mennonite Disaster Services and Christian Disaster Relief, submitted reports on their relief efforts in aid of tornado victims.

Mennonite Disaster Services

Mennonite Disaster Services (MDS) is part of the Mennonite Central Committee, which is the education, health, economic development, employment, relief and peace arm of the Mennonite and Brethren in Christ Churches of North America.

MDS is rooted in the concept of mutual aid. In 1950, the farmers of "Tornado Alley" in Kansas began to respond to the needs of tornado victims in their state. This assistance soon spread to victims of tornados in other states and to victims of all natural disasters in Canada and the United States. In Alberta every Mennonite Church is encouraged to have an MDS contact person.

On August 1, 1987, the day after the tornado struck, a group of Mennonites from Edmonton and Tofield met to draw up plans to respond to the disaster. It was decided immediately that the magnitude of the disaster required a national response. It was learned also that United States units were waiting to participate in the tornado response because so many Canadian MDS volunteers had served in the United States.

MDS generally helps only those victims of natural disasters who do not have the help to get back onto their feet without such assistance. The promise of federal, provincial and municipal assistance, which was to ensure that no one would suffer financial loss as a result of the tornado, made it unnecessary to call in volunteers from the United States.

Two people experienced in heading up disaster relief efforts were appointed by MDS Alberta and the church representatives to give leadership in the clean-up. One had recently spearheaded MDS response to the Coalinga earthquake in California, and the other had been in charge of MDS response to the Barrie, Ontario, tornado.

Logistics

The MDS response was organized on August 3, and swung into action on August 4 in the County of Leduc and at the Evergreen Mobile Home Park. Volunteers who came from out of town were billetted in Edmonton homes until apartments, provided by the City of Edmonton became available. A farm served as temporary headquarters until the headquarters were moved into the apartments.

Food for the volunteers was provided by the City of Edmonton and prepared by women from local congregations. Local congregations and the

Mennonite Centre for Newcomers provided furniture. The City of Edmonton also provided telephones, both mobile and stationary, to ensure communication between crews and headquarters was possible.

The project started on August 1 and ended on November 27.

The work

The earliest response was in helping farmers clean up yards and repair buildings and in providing volunteers to Evergreen to help tornado victims salvage possessions and move furniture. During the rebuilding phase at Evergreen, volunteers helped residents get re-established by helping build porches and skirting mobile homes.

In the County of Leduc, fields were cleaned of debris, farmers were helped with harvesting, fallen trees were cut, assistance was provided at the Emergency Relief Centre and a pole barn was built.

Without the farm cleanup, harvesting would have been impossible. In fact, some farmers were advised by civil servants to burn their fields before they got help from MDS. Burning the fields might have eliminated the combustible debris, but fibreglass insulation and metal would have been left. Alberta Agriculture was alerted to the fact that fibreglass insulation would kill cattle if they ate it. This has happened on a number of other tornados MDS has helped clean up.

As well, counselling and support was provided to victims and efforts were made to restore hope and courage to the victims.

Statistics

A total of approximately 1,500 person days of volunteer work was provided by 391 volunteers. Alberta had the largest number of volunteers with 263. Saskatchewan and British Columbia followed with 64 and 52 respectively. Manitoba sent eight, the United States, three, and Ontario, one. Besides people in Evergreen Mobile Home Park, 76 farms, businesses and homeowners were helped.

Christian Disaster Relief

Christian Disaster Relief (CDR) is sponsored by the Church of God in Christ, Mennonite. CDR was established in the early 1960s to oversee volunteer help given in time of disaster.

CDR, or the volunteers, do not charge for their services. However, they ask that the area involved provide food and lodging if at all possible.

The following is an edited personal account by Ralph Klassen, a CDR co-ordinator responsible for the Alberta area.

We became aware of the tornado at approximately 1700 hours on Friday, July 31. Information was very sketchy, so personnel from the Edberg and Stettler congregations decided to visit the area on Saturday to assess damage. The magnitude of the disaster was quickly established. Contact was made with the City of Edmonton Emergency Operations Centre and we were assured there were enough volunteers for Saturday and Sunday.

On Monday morning, we went to the Londonderry Police Station, where we knew volunteers were being accepted for work at Evergreen Mobile Home Park. It was soon apparent that there was no hope of finding work through this department, so six men were sent to Emergency Relief Services to assist in their work and four men went into the Clareview Area.

After being turned back at a police checkstop at Evergreen, we phoned the Emergency Operations Centre and found out about the Victim Assistance Centre set up at the M.E. LaZerte Composite High School and went there. We were given an office in the school complete with phone and answering service. The Salvation Army would provide meals to our workers at the school and at the Evergreen site. The Red Cross arranged night accommodations at the Steele Heights Baptist Church.

We then received police clearance to inspect the Evergreen site and assess how much aid we could render. Arrangements were then made for six volunteers to spend time at the park starting the next day to help victims search the rubble for personal possessions.

On Tuesday morning 27 men came to the school ready for work. They were dispatched to Evergreen to help search for personal possessions; to Millwoods to reshingle a roof; and to Clareview to help clean up some of the houses. The balance spent their time south of the mobile home park cutting and removing brush on yards and fields. A farmer near the industrial sector was assisted in clearing away debris.

From August 3 to August 10, CDR volunteered approximately 2,097

hours of work. Volunteers came from Linden, Stettler, Crooked Creek, Edberg, Heart Valley, Pincher Creek and Blueberry Mountain.

During the following months, volunteer help was given to Emergency Relief Services, Edmonton. This involved sorting food, clothing, furniture and other donated items. Approximately 850 hours of work were given there.

Long-term assistance

CDR has a sister organization called Christian Public Service (CPS), which works much like CDR except on a long-term basis. We felt there was a need for ongoing help and support in the Edmonton area, so CPS established a unit in Edmonton in early September.

Two townhouses were rented. A couple moved in as houseparents; another couple came as work supervisors; and six young men came to help in rebuilding work. This unit was closed down at the end of April 1988.

The CPS group contributed approximately 10,000 hours of volunteer labor at 19 different places as of April 1988. Costs for the unit, including rent, utilities, groceries, household items and mileage totaled approximately $37,000. Donations of $3,500 were received from United Way and approximately $1,000 from individuals. During startup of the CPS project, CDR provided about 999 hours of labor in short-term help.

Christian Reformed World Relief Committee, Disaster Response Services

The Christian Reformed World Relief Committee is a service agency of the Christian Reformed Church. The CRWRC's Disaster Response Services assists relief agencies and churches in a disaster-affected community in responding to victims' needs, with emphasis on providing people for information and support, particularly in the long-term recovery period.

The following is an edited personal account prepared by Janet DeWaal, diaconal consultant to the Church's Northern Alberta Diaconal Conference.

As consultant to the Northern Alberta Diaconal Conference, I had responsibility for assisting in the diaconal ministry of 23 churches in the area from Red Deer/Rocky Mountain House on the south to Edson/Grande Prairie on the north. From the time the news of the tornado broke and all through the evening that first day, I was trying to work out a strategy for how and where to start mobilizing our churches to respond. While we were totally unprepared for such a disaster, I knew that the resources of our denomination were available, including our well-organized and much used Disaster Response Services program, which was experienced in all kinds of disasters. Headquarters was in Grand Rapids, Michigan, with many volunteers available in the United States and Canada.

Saturday, August 1

Calls came in from the Denominational Disaster Response director in Grand Rapids; from our national office in Burlington, Ontario; and from our Christian Mental Hospital in Denver, offering to send up, at their expense, psychologists who could counsel or train others to counsel victims. Churches and individuals throughout the province called also to offer help.

My immediate task was to assess what was needed and how we could best help.

I contacted the deacons of 10 of our churches in greater Edmonton who could have parishioners directly affected by the disaster and discovered the six families that were involved and the extent of their needs.

I spoke with our denominational disaster response director in Michigan and to volunteer disaster response co-ordinators in southern Alberta who gave suggestions as to the first steps to take. They were all ready and eager to send trained volunteers immediately and were waiting for our assessment of what was needed. A sum of $5,000 was immediately made available to us, with more to follow as needed.

I went to my office and prepared some information cards which described our denominational resources for dealing with disasters and the ways in which we could help, and took them to the Red Cross and Salvation Army. I also sought to find ways in which the many local volunteers available from our church could help immediately. Disaster Relief Services was also contacted.

Sunday, August 2

After worship, I set out with my photographer son to inspect the disaster sites. Even television and previous experiences did not fully prepare us for what we encountered. We walked through Clareview, tried without success

to reach Evergreen, and then turned south to see what had occurred in the industrial and rural areas. I took notes; my son took pictures. The rest of the day was spent in telephone consultations. I requested a meeting of the conference board for Monday evening.

Monday, August 3

An early phone call from our Grand Rapids office informed me of a strategy meeting of the Mennonites (our office had found out through contact with the Mennonite central office). I called the church where the meeting was scheduled and was immediately invited to join them. Their disaster response personnel were well-acquainted with the Christian Reformed disaster response personnel through co-operative work at other sites.

The morning was spent planning strategy. In the afternoon, some of us went to the City of Edmonton disaster command centre at City Hall and to the Victim Assistance Centre which had been set up at M.E. LaZerte Composite High School, where we made the necessary contacts with City Social Services, Alberta Public Safety Services, Edmonton Board of Health, Red Cross, The Salvation Army and others.

Our objectives were to assess the needs and see how we could fit in with effective help; let the various organizations know of our availability and set up communication links; and get to know the necessary contacts in the Leduc/Strathcona areas.

The Mennonites focused their efforts on clean-up and volunteers from our churches were referred to them. Crews began that same day. I began to see clearly how we could fit into the overall response. Our denominational response in the United States takes two forms. One is rebuilding with volunteer labor. It was clear that insurance and provincial and federal aid would respond to most of these needs. The other form of response was advocacy — long-term support of victims. It was here that I saw a need and our challenge, and I shared that at the evening board meeting. It was decided to request help from the Christian Reformed World Relief Committee's disaster response program in the form of trained managers who would help us get the program off the ground. The phone call was made to the director, who assured us that a husband/wife management team had their bags packed and would be on the first plane the next morning. A call to one of our churches got a quick response — office space located near the Clareview site. We worked out a strategy for communicating with all of our churches and set up a meeting for representatives from all of our churches for Thursday evening.

Tuesday, August 4

Our dining room table became the strategy centre for disaster response planning on the part of local personnel and trained volunteers who had come in from southern Alberta. Further work was done in making connections with appropriate officials at the various disaster sites, organizing our volunteers, and working out co-operative relationships with the Red Cross (victims' registry) and the local Board of Health (responsible for long-term follow-up).

Our Disaster Response Services office was set up and the basics of the program were developed. We would train and co-ordinate volunteers who would, in turn, provide to victims a listening ear, friendly support, advocacy support (helping people to access the services they required to meet their immediate, ongoing and future needs) and referral information.

In the evening, the volunteer managers arrived and were settled in.

Wednesday, August 5

The newly arrived volunteer managers (together with two local volunteers who gave up their holidays to work full-time in our program) went to work, getting acquainted with local officials and services, planning the specifics of the program and organizing the training sessions.

The next several days were spent supervising the development of our Disaster Response Services program. The program eventually involved 107 volunteers who provided over 3,000 hours of short- and long-term recovery support to 200 individuals and families with a budget of $16,000.

9 *Communications*

Media

Edmonton's news media had their hands full coping with the effects of the tornado disaster on them, and with the public's demand for information. Reports from various news outlets relate problems of short staffing (it was the onset of a summer long weekend and many people were leaving work earlier than usual), power disruptions, and their own concerns for family and friends. Telephone lines not downed by the storm were vastly overloaded. The tornado passed within a mile of the printing plants of both daily newspapers, causing lengthy power outages.

Amidst the confusion, the media encountered numerous problems in gathering information. Not the least of these was deciding which sources of information were the most credible. A serious example of this was the problem of getting an accurate fatality rate. A total of 27 people died from injuries received during the tornado, but the media were receiving and broadcasting numbers as high as 100 early in the situation. One person wrote of a phone call he received from his mother who had called because the media in Calgary were reporting that "Edmonton has been laid waste by the tornado". Similar queries came from as far away as Australia.

George Oake, managing editor of The Edmonton Journal, sums up the problem this way:

> "In one sense a disaster is the easiest story for journalists to cover because the story is dramatic and simple. There are easily defined heroes and villains; in this case the anguished citizens of Edmonton against rampant nature. Yet the simplest story is often the most difficult to cover in the modern urban context because of bureaucratic authority. When a plane crashes the ministry of transport immediately seals off the area; the police don't like reporters to watch them execute arrests. There are obvious good reasons for such stringent controls in a complicated world, but these tactics often make it extremely difficult for the media to get at the truth and report the immediacy of an event, not to mention the role played by the bureaucracies charged with dealing with the disasters.
>
> "In journalism we refer to this as the 'command post mentality'. This is a situation where journalists, barred from the actual event, have to rely on ubiquitous 'official spokesmen' who often convey a third-hand description of the disaster which usually contains praiseworthy descriptions of their own organizations."

From Terry Field, executive producer of CBC (Canadian Broadcasting Corporation) Edmonton:

> "Where the officials really failed is where they always fail: dealing with information. The reason they fail is because they don't understand or

trust the media and they are not trained to package information.

"Hours went by at command posts before anything useful came from anyone. And at City Hall, the story was the same. It is imperative that responding organizations have people within their ranks who can deal with the media...saying what they can, when they can. Saying 'we don't know yet' is not a crime as long as they really don't know. Saying 'we don't have an accurate death count but can confirm at least two'. In short, share whatever information is available at 15-minute intervals from each command post in the city, no exceptions.

"Officials must learn that at times like that, the media are needed by the public. The thirst for information cannot be quenched, and their job is to get information out, not horde it or wait until they have the entire story."

The following is a compilation of edited reports from various print and broadcast media in the Edmonton area and a report on the Government of Alberta Public Affairs Bureau's activities in managing communications surrounding the event.

The Edmonton Sun

Report by Randy McDonald, Managing Editor

When something as horrendous as a twister hits, killing 27 people, leaving hundreds of homes and businesses in ruins, and many more people in hospital or out on the street, you realize what gaping holes you have in emergency planning.

The Edmonton Sun has learned a whole new set of rules have to be in place when a story of this magnitude happens. This was the closest the Sun has come in 10 years to not getting a paper out.

The power went out in our editorial offices. Everything went dead — the phones, computers, our radio link with our photographers, lights, radios, TVs...everything!

Friday is not a busy day because we do not publish a Saturday paper, so staffing was at a minimum. Word rippled through our offices that a tornado was heading our way. It was then we began to realize how important the little things are, such as batteries for the radios, proper emergency lighting for the offices. The tornado passed within a mile of our office.

How did we cover it?

Our communcations network was crippled by the tornado passing by our offices. As a result, we had no contact with any staff; no way of reaching photographers because our radio system was knocked out and the phone

lines were dead; no way of reaching reporters. We were cut off.

Our presses also were knocked out.

No power meant no computers and no ability to begin the writing, editing and layout process. The power was off for close to 20 hours; then it came up only for short times throughout the following day. It was not fully restored until about 0100 hours on Sunday, August 2.

We had no way of keeping the wire services, or the Toronto or Calgary Suns informed as to what was going on.

Access to our editorial offices by staff trying to get to work was halted due to the mess on the roads and the heavy traffic jams. At the outset, we had no immediate feel for or indication of the immense destruction the tornado was causing. Radio reports filtering in reported widespread damage and injuries, then a death, then reports of more deaths, then reports of a trailer court being wiped out.

Our first response was to pull every available person in the office off whatever they were doing at the time and having them try to make their way to the hardest hit sites. A city editor made the call on where to send limited staff based on the early reports of the sites hardest hit — the mobile home park. They were instructed to keep at least one photographer and reporter at the site and send whoever showed up later on to other areas hit.

It was this word-of-mouth plus the initiative of reporters and photographers who came in on their own that enabled us to have staff at the sites hardest hit. A photographer was given the responsibility of tracking down a helicopter for an aerial perspective. He simply lucked out by getting one which would take him up in the storm. Throughout the night an editor stayed in the blacked out newsroom to instruct photographers and reporters on our coverage plans.

We patiently assumed that power would be restored at some time. The most disheartening blow came during the first flicker of power when the live shots of the tornado taken by staff members were run through the developer. The subsequent power outage cost us some irreplaceable photos. At that point we decided to take over a photo lab downtown, one untouched by the tornado. We had all our photographers run film there with only the finished prints brought to the office.

We arranged with our sister paper in Calgary to fly up staff and resources to put the paper together there. Papers would then be trucked back to Edmonton for delivery. We arranged a "time of no return" when we had to go or stay. As luck would have it, we had an extended period of power and, assuming we were back on track, decided to stay at home with the edition. Soon after, the power crashed again.

When our phones were restored, we found ourselves deluged by callers from all points of the world trying to find out what had happened. Many

callers were distraught kin of city residents they were unable to reach. The only thing we could do was to tell them politely what we knew and direct them to the crisis line.

This was a once-in-a-lifetime story for photographers and reporters. Sun staff met with few problems at the disaster sites. They were able to do their job without interfering, and, I believe in this case, co-operated fully with authorities. The police were accessible to the point of setting up times for the press to tour the disaster sites.

We realized that this was a story that had to be told vividly and completely. It was a visual story, one that begged for every scrap of information available, and we simply decided to not pull any of our punches. We received criticism on occasion that we invaded the grief of the victims. We had no other choice but to be straight with this horrific event. We carried this policy throughout the trying days that followed as we covered sobbing homeowners picking through the debris of what was once their homes, or a grief-stricken mother standing behind four coffins containing her family.

It was during one of the power outages on Saturday, August 1, that the idea came to start some sort of fundraising venture for the survivors. Even toughened media types were touched by the trauma and disaster to "their town" and being able to help out was important to us. A campaign using the three Sun newspapers in Canada to raise funds for the survivors was launched.

Jasper Printing volunteered to work with us on a glossy magazine from which all proceeds would go to the victims. One editor was set free for 12 hours a day for three straight days to select the photos and work with the printers to put the magazine together. We were amazed at how it went over. It went into two printings and raised some $440,000 for the Tornado Relief Fund, as the magazine was quickly recognized as the official record of the tornado. The Sun arranged with the Red Cross to have their officials look after the finances.

The Edmonton Journal

Report by George Oake, Managing Editor

The first intimation of what was going to be a tumultuous two days at The Edmonton Journal occurred at 1502 hours, July 31, when citizens phoned to report funnel clouds near Beaumont, southeast of Edmonton.

Such calls are not unusual in the high summer months and the Journal's perceptive photodesk asked citizens to photograph unusual phenomena and turn their films over to the paper. A rookie staff photographer was dispatched to the area.

The photographer decided to gas up at the Journal's Eastgate plant in southeast Edmonton before continuing on his routine assignment of scouring the Beaumont area for funnel clouds. As he pulled away from the plant, he spotted the ominous black vortex roaring directly toward him. At 1530 hours, he was on the radio phone to the office reporting the awesome sight.

"The thing is coming right at me; I've got to get out of here," he reported.

"Stay there, stay right there, and keep shooting," replied the executive news editor, half seriously and half in jest.

By this time most of the newsroom were huddled around the radio phone. Almost immediately, police and ambulance frequencies monitored by the Journal erupted with frantic calls signalling a major disaster.

The photo editor immediately sent every available photographer to the stricken Millwoods area. Every available cityside reporter was dispatched to cover the emerging story. Because it was late Friday afternoon, some reporters had left for the day, so every available body, including columnists and special section reporters, was drafted from every corner of the news operation.

By 1730 hours, there were 27 reporters and eight photographers in the field and the editors were tearing the planned 76-page Saturday paper apart to make room for what was clearly the story of the day.

A further complication surfaced when electrical power surges, a symptom of the chaotic weather, darkened the Journal's computers. Telephone lines were down and certain areas of the city simply could not be roused. Reporters in the field equipped with radio telephones, combined with fragmented police and ambulance calls, presented a mosaic of often conflicting information which made planning difficult. Dead and injured totals were added up on scratch pads and then scratched out.

When a second tornado was reported heading directly to the downtown core, reporters and editors calmly went about their tense business, acknowledging what might have been a threat to life and limb only to the point of asking people in the field to check out the reports.

Edmonton's tragic tornado, in a very real sense, ambushed the city. Heavy rains and high winds made streets impassable, so Journal reporters were often first on the scene. Radio reports from the field crackled with reports of bodies and debris scattered at roadside. Some reporters and photographers were comforting the injured when they first arrived on the scene and informing the police officers of hard hit areas. All of this resulted in unusually graphic reporting.

Dennis Wenger, co-director of the University of Delaware's Disaster Research Centre, noted the immediacy of the Journal's coverage and praised the paper for doing one of the best jobs of coverage he had ever seen by the media.

But all the vivid copy in the world is useless unless you can get it into type, and, working feverishly, Journal technicians managed to revive the computer system by 1930 hours. Copy editors set to work and the photo department was in the process of processing 1,500 frames of color film from staffers and freelancers. Eventually 150 frames would be selected for senior editors to choose from, and 12 separate pictures would be sent to Canadian Press for transmission around the globe.

The Journal was grinding towards deadline when editors were apprised of another problem. While the twister had missed the Journal's Eastgate production plant by a mere 300 yards, it had torn out the area's electrical supply. At least 2,000 volts were needed to crank up the paper's 27 press units which print the 200,000 Saturday edition.

The production director tried to rent generators, but none could be found with the required power. It began to look as if publication was impossible.

The editor phoned publishers of smaller papers in the area in the hope they could run off the Journal. However, even combining the capacity of several plants wouldn't work because all of them had different press configurations.

The Calgary Herald, the Journal's sister paper 180 miles to the south, offered to help. But how would we get papers back to Edmonton and distribute them throughout the area?

Canadian Airlines said it might be possible to charter a Boeing 737 to bring the papers back from Calgary if they could round up crews to turn the aircraft into freighters. It was estimated it would take four Boeing 737s, each with a payload of 64,000 pounds, to carry back the full run of the 76-page Saturday paper. The publisher made the decision to scrap the regular 76-page paper in favor of a 12-page special tornado edition with advertisements and wrapped in color front and back. It would be printed at the Calgary Herald and trucked back to Edmonton in the wee hours of the morning.

The managing editor called North American Aviation to charter a Lear jet to get the special volunteer press crew carrying the 12 negatives that would produce the plates for the 12-page edition.

Reporters and copy editors were working flat out to edit and make up the pages for a midnight departure. At 0212 hours the Lear finally roared into the stratosphere on its journey south. By 0400 hours, 150,000 copies of the special edition had been run off the Herald presses and were being loaded in trucks for the three-hour race back to Edmonton.

The power failure at the Journal's Eastgate production plant put the entire circulation plant in the dark and electrically operated doors had sealed in the Journal's delivery vans. Working through the night by candlelight and flashlights, the circulation crew managed to pry open

the doors and gear up for distributing the edition. The first papers were on Edmonton's streets by 0930 hours, a herculean feat under the circumstances.

The edition was sold out in the stands and stores within minutes. Demand for the disaster special was so heavy that an updated reprint of the special edition was inserted at no extra charge in the following Friday's newspaper.

CJCA Radio

CJCA won the Western Association of Broadcasters Gold Medal Award for outstanding service to the broadcast industry in relation to its coverage of the tornado.

This is an edited version of the report submitted by Ken Davis, assistant news director.

It is early afternoon of July 31 and the newsroom has the easy ambience typical of a Friday afternoon heading into a mid-summer long weekend. I'm filling in as editor/newscaster. Reporter Bill Douglas is the only other person on duty.

The weather report at the end of the newscast at 1500 hours gives little hint of trouble. As I emerge from the news booth, Douglas has just transcribed an Environment Canada Weatheradio alert saying a tornado touched down briefly near Leduc. More tornadoes are a possibility.

Alarmed, I take the warning into the control studio and ask the operator to cut into a live talk show to warn our listeners. He does so at 1513 hours. Meanwhile, Douglas has received a call from a listener who says a tornado has just roared by his place near Beaumont and appears headed for Edmonton. Douglas calls the Weather Office for confirmation. I pass the news directly to the on-air talk show host, who announces a tornado has been seen in the Beaumont area.

I am taking calls from people who have seen, or are watching, the twister. I write down addresses and descriptions, trying to plot the path of the tornado. I go to air from 1524 to 1528 hours recapping what little we know.

At 1530 hours, I go back on the air with a news update, indicating the tornado has touched the outskirts of Millwoods. The weather office is talking of a cell of tornadoes in the area. The afternoon drive show begins. However, for the next three hours the program really is a "news special" with the drive show host anchoring.

We are a talk show radio station with eight incoming on-air phone lines. All are full now: a tearful woman who has just lost the roof off her home; news director Joe Meyers (with binoculars) describing the approaching

tornado from his northeast Edmonton home. Caller after caller develops a picture of heavy flooding, traffic jams, large hailstones, houses damaged and a large tornado raging up the east side of Edmonton.

The telephones in the newsroom also are busy. We tape some eyewitness reports for later use in newscasts. We continue to take down addresses in a bid to map the devastation and hopefully to provide warning to those in the tornado's path. Douglas and I both are very conscious that eyewitness reports are notoriously unreliable and try to find consistencies to give a more accurate sense of what is going on.

Above all, I must overcome my own panic. As assistant news director and the newscaster on duty, I'm responsible for co-ordinating the newsroom's coverage of this disaster. But how the hell do I do that with only two guys on duty?

It's now 1540 hours. I try to reach all news staff. Meyers is at home and still watching the tornado with his binoculars. He files his own eyewitness report and is forced to interrupt a later report when the tornado comes so close to his home that he dashes to the basement for safety.

The phones are ringing in a frenzy, not only with calls from frightened citizens and eyewitnesses, but also from police, Environment Canada, the city's emergency response team and other key players. I find a reliable staffer in the general office and put her to work answering phones and taking notes.

My next priority is organization. Who is to do what?

The lion's share of our coverage at this point is generated by the live on-air calls to our talk-show host. We keep the monitor turned up loud in the newsroom to keep track of these accounts. We also have the police band monitor turned up.

The sports director is making calls to city officials and business people he knows to gain an inside track on the devastation and what is being done to deal with it. His periodic on-air cut-ins are reassuring to listeners.

We are getting dozens of calls from anxious people worried about family and friends. Radio stations from other cities also are calling us, seeking interviews. On-air we ask people not to use the phones unless it's absolutely necessary. The appeal is useless.

Fortunately our exchange holds up. A senior inspector with the Edmonton Police Department calls us to say he thinks we are doing a remarkable job and that most emergency response personnel have their radios tuned to us. In fact, he says they are using our broadcast to help them determine where they are needed most.

In addition to the phone calls, the police "hotline" (a one-way phone hook-up from Edmonton police and fire departments) and the City of Edmonton teleprinter continue to provide us with important updates.

In addition to being the on-air news anchor, I must keep all the information organized and accessible. Initially I try working with the new computer in our news room. However, we are not yet familiar enough with the system to use it quickly, and I abandon it for good old-fashioned typewriters.

Sheets of paper are organized in stacks across the newscast make-up table. One pile describes the geographic areas hit by the tornado and the weather office updates; another records areas that are closed to, or snarled by, traffic. A third stack of papers lists official statements, while yet another pile is dedicated to the people and agencies who are providing public information and assistance.

I rule out sending anyone to the scene. All indications are that traffic is snarled throughout the city. It also is difficult to know how many disaster sites there are.

I get a call over the two-way mobile radio from Meyers. He is in his car and is approaching the residential areas in his part of the city that have been hit by the twister. Soon he is sending in chilling accounts of the devastation.

The Broadcast News wire service has been a disappointment. BN staff don't appear to have any handle on the story, and obviously all the contributing newsrooms have not yet had time to file stories with the agency.

I am fairly satisfied that we have a good understanding of the situation. We are in contact with the Salvation Army and Red Cross regarding their assist efforts. We have a volume of numbers and locations for those who want to volunteer their help. The picture is far from complete, but at least we have a good thumbnail sketch and options for constructive action to offer our listeners.

There have been a few problems with accuracy, but not many. Death and injury counts consistently prove a source of error.

Leading up to my major newscast at 1700 hours, a new crisis emerges. We are getting reports of another band of tornadoes headed our way. Someone calls to say a tornado appears about to touch down in west Edmonton.

We advise people to brace themselves for the prospect of more tornadoes, trying to make our message low-key enough so as not to stir more panic. We tell them how to seek the safest possible shelter. (We had a listener with an encyclopedia call in to tell us what to do in a tornado — we didn't know!).

However, the second storm cell passes over without further damage.

The focus of our operations begins to shift after the 1700 report. We are becoming more concerned about the aftermath, the clean-up and the casualties. We call the hospitals to find out how many people are injured and where they are turning up. We check with the Red Cross and the Salvation Army on blood donation centres and disaster relief. We get word on shelters being set up for the homeless.

The City of Edmonton Emergency Operations Centre is sending out a steady stream of updates. It soon becomes clear that the centre is the hub of the wheel and our reporter heads over at 1800 hours. We have our own studio at City Hall which will help him file regular reports.

We still don't know how many are dead. Occasionally there is confusion over jurisdiction. For example, is the medical examiner's office or the local police responsible for announcing death totals? The number of dead keeps changing as police, ambulance and two different municipal jurisdictions continue to issue different versions of the disaster.

We agree to scale down our coverage and actually go off full coverage around 1850 hours. We provide news updates throughout the evening.

We also decide to provide extensive eyewitness news coverage the following day. I call the Edmonton Flying Club and make arrangements for a plane the next morning to fly over the path of the tornado, then I type up a list of names and contact numbers of various government and volunteer agencies collected over the past three hours on scraps of paper. I distribute copies of the list to those who will have need of it.

The next morning, one of our reporters goes up in the plane and files live reports on the destruction as seen from the air. He tours the Evergreen Mobile Home Park with various government dignitaries, including the premier and the prime minister.

Meyers files reports from Evergreen and Clareview.

We normally play music on weekends, but our talk-show format is in full swing through much of this day. The phone lines remain full with people and agencies wanting to help in every way possible.

Many businesses call to volunteer products and services. We have to assess which are sincere and legitimately needed and which represent little more than a cynical attempt to cash in on the tragedy.

Even our psychologist talk-show host joins the show for a while to offer guidance and advice.

Other media reports

Nearly all the media reported difficulties in getting accurate, up-to-the-minute information from official sources as to the progress of the tornado, the number of casualties and the extent of damage.

Steve Halinda, assistant manager of news and public affairs for Sunwapta Broadcasting Ltd., which owns CFRN-TV, CKXM-FM and CFRN-AM, reports that the group's integrated newsroom first learned of impending catastrophic weather conditions from Environment Canada over the Broadcast News wire. However, the first confirmation that a tornado had developed and was bearing down on Edmonton came from several

eyewitnesses who phoned from the Beaumont area. The calls began at 1515 hours, but confirmation with the Weather Office was delayed because of difficulty in getting through on the telephone to the Weather Office, so the station didn't air its first radio bulletin until 1530 hours.

At this point, the Sunwapta newsroom dispatched reporters and cameramen to the Millwoods area, Strathcona County and the Evergreen Mobile Home Park. "We discovered that our reporters and cameramen in the field were our best source of information in terms of casualties and damage since they were able to communicate information from the scene," says Sunwapta radio news producer Andy Smith. "Our reports of the death toll were faster than the official count from City Hall. Our frustrations centred on the difficulty trying to get in touch with official sources by telephone. We feel our staff were much quicker in reporting damage and traffic conditions in the affected areas."

Doug Main, then senior producer-public affairs with ITV, reports the television station also had difficulty getting official notification of the extent of the emergency. "We did not fully understand the extent and severity of the tornado until we received our news pictures back in the building around 1630 hours," he reports.

"By 1730 hours we had several different death totals from several different sources and this created hardships for people attempting to write and present an accurate picture of the events as they were unfolding. The totals coming into our newsroom were variously reported as 100 dead, 60, 35 and eventually 27 (the correct total). We also experienced difficulty with phone numbers. The Red Cross and other emergency organizations gave us phone numbers initially, then changed them or asked that we stop broadcasting them."

Main also describes the difficulties the media experienced gaining access to the affected areas: "It became an impossible situation. Since we were not totally aware of the extent of the storm, we dispatched camera cars to get some pictures. When they reached the damage sites and found the extent of the destruction and radioed back for help, we could not get people to them because of the congestion on the roads. It was taking up to 45 minutes to travel a distance that normally can be covered in seven to eight minutes. Multiply that by five or six camera cars, four or five locations, and you see the difficulties." The media also reported they were prevented by police in some cases from entering the disaster areas.

Several media reported they have installed auxilliary powered weather radios in their newsrooms since the tornado.

Conclusions and recommendations

The following conclusions and recommendations were culled from various media reports:

1) Severe weather warnings should be taken more seriously by government safety officials, the media and the public.
2) Severe weather warnings should be more specific in terms of wind velocity, probability of tornadoes and heavy rainfall.
3) The media need improved communications with the weather office, local authorities, and police and fire agencies. It was suggested that the city's Emergency Operations Centre install a permanent video hook-up available to all news outlets in the area, so that TV stations can tap into live disaster headquarters feed from time to time to augment their own coverage.
4) Members of the media and municipal and provincial governments should establish a disaster plan that would allow authorities to maintain order while letting the media have access to information and locations so they can provide a quick, accurate portrayal of events as they happen.
5) All emergency agencies should have power supply back-ups to assist communications if power outages occur.
6) Signing for the deaf should be available on all emergency broadcasts. If stations have closed captioning equipment, this is a relatively simple process, since the operator will likely be at the station or nearby. If a signer is required, arrangements should be made to have a list of people available on a call-in basis.
7) All media should have their own disaster response plans in place, including phone lists of managers and employees and clearly defined responsibilities for all staff.

Terry Field of CBC Edmonton describes how his station's tornado coverage, involving more than 70 staff, was handled:

"Coverage was orchestrated by me, the executive producer of the news, who relayed instructions to three senior editors, who in turn relayed instructions to reporters and camera people. It is a large task to move people in and out of a disaster area safely and quickly. We did this by crew rotation in and out of the station (because of the rains it was necessary to dry cameras out every hour or so) and by leap-frogging crews in a northeast line from Sherwood Park (along the path of the tornado).

"Back at the station in the early stages, we had one reporter and tape editor assembling the pictures taken by all our crews. That meant our crews were in the field for the maximum time possible while we were still able to prepare for the show."

While ITV was the first station in the area with video (at 1630 hours), Doug Main admits to shortcomings in the station's tornado coverage due to the structure of its news operation and lack of available staff.

"We have (now) developed an approach to covering major breaking stories like this that delineates clear roles for individuals and prevents things falling through the cracks.

"The most important position and seemingly the most obvious is to have someone in charge (although this is often overlooked in a situation such as a natural disaster) and then to have other individuals in control of specific areas of responsibility:

a. Co-ordinating producer — responsible for the overview, making the final decisions on who will do what and what needs to be covered.
b. Technical producer — organizes the on-air times and occasions for news bulletins and inserts; arranges incoming feeds from satellites, if required; delegates authority in control room if needed to get bulletin material on the air.
c. Assignment producer — arranges for cameras and reporters to be at specific location; co-ordinates activities of TV engineering crews and editor; deals in story treatment and approach in consultation with the show producer.
d. Show producer — assembles available material into a newscast; responsible for writing and editing material for news bulletins; works with above named individuals to ensure all bases are covered.

"These individuals and their staff are responsible for the 'behind the scenes' activities relating to an emergency situation. The on-air personnel should be freed as much as possible from any need to be involved with anything other than their duties on the air."

Alberta Public Affairs Bureau

The Public Affairs Bureau (PAB) is the communications arm of the Alberta government. The PAB operates its own central office and staffs the communication branches of most government departments.

The provincial government's Emergency Operations Centre (GEOC) was activated at 1615 hours on the afternoon of the tornado. By 1725 hours, the Alberta Public Safety Services (APSS) communications manager had a staff assembled, despite difficulties in locating staff at the start of a long weekend. (See also the report from Alberta Public Safety Services in Section 2.)

Over the next three days, a total of 14 Public Affairs Bureau (PAB) staff attended to the following responsibilities from the public/media response centre at the GEOC and other locations:

- co-ordinated information flow to the media and public
- co-ordinated and released media information updates
- staffed media and public information inquiry lines
- provided information to the public and media as received from the APSS Government Emergency Operations Centre
- forwarded inquiries needing replies from appropriate spokespersons in the GEOC
- carried out on-site media relations, as required, including arrangements for media conferences and interviews
- provided technical services including writing and editing
- arranged for advertising as needed, such as ads to inform the public of victim assistance programs
- provided assistance at the M.E. LaZerte Victim Assistance Centre during the emergency
- prepared a post-event analysis of the communications aspect of the emergency

Lessons learned

1) Long shifts required in a full-scale emergency response, problems in locating staff, and problems with phone lines pointed out the need to expand the list of PAB emergency response staff. The PAB duty roster now includes all PAB communications staff.
2) Many problems were encountered due to the telephone/communications equipment, physical layout and location of the public/media response centre. Specifically:
   - The phone lines were difficult to operate in dialing long distance or transferring calls. Having only two lines was not very useful and having both ring through at once was distracting.
   - Location of the public/media response centre on a separate floor from the GEOC meant a time lag in communicating up-to-date information and required an extra body to play "runner" between the areas. In the

future the communications centre will be located on the same floor as the GEOC.

- Because there was not a separate word processing/typewriter area, communications staff trying to write news releases had to contend with the distraction of phone lines ringing. Space set aside for writing of news releases should be separate from the telephone and media area.
- Concern was expressed about the possibility of power outages and a breakdown of telephone communications. PAB staff are now aware that APSS has an agreement with the ham radio operators of Alberta and that the Community Police Radio Network operates an emergency response group and has many volunteers for distributing information items such as handbills.
- Communications staff had difficulty reaching members of the media in the evening/long weekend. PAB staff have been made aware that media can be reached via police band radio. In addition, through personal contact and through the Radio and Television News Directors Association, the APSS communications manager has access to home telephone numbers of many provincial media people.
- It was difficult to keep in touch with communications staff operating offsite. Voice pagers will be purchased by the PAB for use in future emergencies.

10 *Recovery*

Alberta Disaster Assistance Committee

This is an edited version of a report by Danny Muloin, chairman of the Alberta Disaster Assistance Committee.

The Alberta Disaster Assistance Program is administered under a provincial policy and assistance regulation from which the Disaster Assistance Committee makes recommendations to the minister in charge of Alberta Public Safety Services (APSS). The committee is a multi-disciplinary body with permanent representation from Municipal Affairs, Agriculture, Transportation, Treasury and Environment.

Within the organization, the chairman of the committee is the representative of Alberta Municipal Affairs. The committee is responsible to the managing director of APSS and is authorized to make an assessment of damage or loss caused by a disaster, as well as advise on the determination of eligibility of applications for disaster assistance and recommend eligible applications for payments, among other things.

Because every event is different, additional procedures must be established in order to provide equitable assessments for all loss and damages to pre-event conditions of all disasters. In the case of the July 31, 1987, Edmonton area tornado, the objective of all government departments was to provide immediate and interim care for individuals and families directly affected by the main and related storms. In consideration of longer-term recovery, individuals and families again took priority. Therefore, their recovery assistance program was announced on August 14. Separate recovery programs were announced for agriculture and business on August 20 and 21 respectively.

Although the programs were announced separately, their development shared a common set of factors and principles. Existing disaster assistance programs appeared suitable for most areas except those directly affected by the tornado, where the destruction was of a scale unprecedented in recent memory.

Therefore, additional procedures were required for assessors for the appraisal of loss and damages of real property. The first step was a meeting with Municipal Affairs senior management officials of assessment operations to review the boundaries and the properties affected by the respective storms. The meeting resulted in a pool of well over 50 assessors from regional assessment offices in Stony Plain, St. Albert, Grande Prairie and Red Deer to appraise the loss and damages immediately. The second step was to set up meetings with assessors in different assessment regional offices to review the respective disaster programs.

Because of this unusual event, new procedures were introduced to the assessors in the appraisal of individuals, families, farms and businesses directly affected by the tornado who suffered catastrophic losses to chattels, real property and assets beyond the scope of existing assistance programs. Such cases, with few exceptions, were those in which the loss was such that immediate financial relief was required to assist with the incalculable costs

related to continuance of family or business existence and for which insurance did not adequately compensate.

In the case of Evergreen Mobile Home Park, the appraisal would often have to be subjective, as there was nothing left to appraise. Again, new procedures and equitable guidelines were required. In addition, the investigation of basic transportation needs for individuals required appraisal within the industrial sector, and the Evergreen area required short-term assistance because of distance from transportation routes. Also, for the first time, well over 200 mobile homes of all ages and sizes, together with additions, required appraising and in many cases nothing was left to appraise.

The assistance provided under the Alberta Disaster Assistance Program for the replacement of mobile homes was very complex for the following reasons:

1) Insurance coverage was widely disparate.
2) Most trailers were 1973-to-1976 vintage and largely depreciated.
3) Unskirted trailers were not insurable under dwelling insurance policies.
4) Some residents did not wish to return to Evergreen and their mobile homes because of emotional stress.
5) Cash settlements by insurers differed substantially.
6) Some partially destroyed homes and contents were further damaged or removed during safety and rescue operations.

After a thorough examination of the case files, the following approach was adopted to assist the Evergreen residents in re-establishing themselves in appropriate dwellings.

1) Provide a basic grant for uninsured trailers or supplement insurance payments to the actual cash value of the basic unit destroyed or written off.
2) Supplement the basic grant by replacement cost of additions, options and improvements to the basic trailer unit as existed before the tornado.
3) Supplement the basic grant by the actual cost of hook-up, skirting, levelling and blocking.
4) Supplement the basic grant based on a percentage of the difference between the actual cash value and the replacement cost of a new trailer of similar size. The percentage is determined by the "wasted depreciated value" of the model year of the original unit.

With respect to catastrophic losses, the same principle applied to farms and businesses in order to achieve equitable assessment valuation to pre-event conditions.

For the first time, the assessors were confronted with dealing with families or individuals who had lost family members or were injured seriously. This required excellent public relations, and each case had to be approached in a compassionate way. The assessors completed well over 1,500 appraisals for this event and in an extremely short period of time to a very high standard.

A total of $36,237,326 in assistance was eventually paid to 1,027 applicants. Of these, 473 individuals received a total of $4,652,697; 215 business applicants received $19,786,073; 330 farmers received $2,843,414; and nine municipalities a total of $4,862,678. In addition, $4,092,464 out of the $36,237,326 was paid to a number of provincial government departments for their costs.

A significant number of the applicants receiving assistance suffered catastrophic loss and damage, including 283 of the 473 individual applicants, 185 of the 215 business applicants, and 23 of the 330 farmers.

The Recovery Program, Governments of Alberta and Canada.

Industrial Recovery Assistance Report

On July 31, 1987, the trauma, injuries, loss of life and destruction of property caused by the tornado required an immediate response by the Government of Alberta to support and deal with those affected by the tragedy. For the week after the tornado, the priority of Alberta Public Safety Services (APSS) was to co-ordinate immediate and interim support to all parties directly affected.

An estimated $500,000,000 in damage was incurred: $100,000,000 to residential property, $100,000,000 to crops, $150,000,000 to businesses, $50,000,000 for economic loss, death and liability, and $100,000,000 unreported.

Individuals and families took priority, and because of the catastrophic nature of the tornado, separate and enhanced recovery programs were announced: an assistance program to address the special circumstances of individuals was announced on August 14, an agriculture damage program on August 20, and the Industrial Recovery Assistance Program (IRAP) to help businesses on August 21.

A separate IRAP co-ordinating office was immediately established and opened for business on August 24 as a result of the combined efforts of Alberta Public Works, Supply and Services (PWSS), Alberta Economic Development and Trade and Alberta Public Safety Services. IRAP personnel, who were chosen on the basis of experience to immediately judge a business tragedy and deal with a specific situation objectively, came from the provincial departments of Economic Development and Trade (Small Business Division), Career Development and Employment, Alberta Public Safety Services, and the federal departments of Regional Industrial Expansion, and Employment and Immigration.

The IRAP office was deliberately located adjacent to the tornado site to make it easily accessible for businesses. By uniting the various business services and necessary expertise under one roof, IRAP followed the innovative, one-stop approach that had earlier proved so successful in co-ordinating all the disaster social services for tornado victims in one location. This single focal point of contact was instrumental in cutting red tape and dealing expeditiously with all business concerns, particularly since it was recognized that time was of the essence in re-establishing businesses.

IRAP was set up to address the unique set of circumstances resulting from the tornado by providing immediate, tailor-made support to help re-establish enterprises and maintain employment levels. In particular, it was recognized that normal business insurance coverage could not readily and responsibly deal with the extent of damage incurred—especially if businesses were to survive and be re-established to their pre-disaster levels. The major-

ity of damage was to buildings and equipment in the industrial areas of the southeast corner of the city and neighboring Strathcona County, but there were as well many individual and extraordinary losses.

The priority of the IRAP office was to address all business issues, thereby assuring that the businesses and workers affected by the disaster were re-established as quickly as possible. This clear statement of purpose of restoring the business community to pre-disaster conditions demonstrated to the businesses affected that all those agencies involved had the same target—"Get everybody back in business ASAP!" IRAP guidelines were designed to supplement support available from traditional insurance sources and established granting agencies in government.

As each disaster was unique and each business tragedy different, it was imperative to design a multidimensional response covering all aspects of business reconstruction. The support and advice from government departments and other agencies allowed for a tailor-made set of initiatives which reflected the compassion necessary to deal with the post-disaster circumstances. One of the most important and unique aspects of IRAP was a stress counselling service to recognize the emotional needs of individuals as they reconstructed their livelihoods.

Special criteria were developed by a committee of senior representatives from APSS, other provincial government departments and Emergency Preparedness Canada for the Industrial Recovery Assistance office to use in determining financial assistance to companies suffering catastrophic loss.

These were:

- a re-establishment grant of up to $15,000
- a clean-up grant not to exceed $40,000 for expenses not covered by insurance
- forgiveness of up to 80 per cent (based on 50 per cent of capital reinvested and $10,000 per retained employee) of a bank loan for re-establishment of the business to its July 30 status, and interest payments on the balance of the loan for a period of two years.

Catastrophic loss to the company was roughly defined as physical destruction and/or the financial cost which would make re-establishment extremely difficult to impossible. This determination was made through on-site appraisal and an analysis of each business situation, using recent financial statements and other information available from the business. The Economic Development and Trade officers and analysts were all qualified and experienced, and were able to make the necessary judgements required and help develop a business plan.

It very quickly became apparent that the financial assistance guidelines

could not be cast in bronze. For example, a few companies had cleanup expenses not covered by insurance which exceeded $40,000, and the minister approved special exceptions where these were justified.

Eleven months after the tornado, a total of 286 applications had been considered by the IRAP office and 140 new applications for assistance had been filed there. Eighty-four requests did not meet the IRAP criteria and were sent to Disaster Assistance for consideration under the regular Disaster Assistance program. The remaining 202 applications ranged from individual self-employed truck owner-operators to very large international firms.

Because of the devastation and loss of company records, the IRAP office worked closely with business to plan for the future and recreate their records.

In total, $21.7 million in disaster assistance grants or loan payments was provided by the IRAP office to assist businesses in their re-establishment and to maintain employment. Of that $21.7 million, $2.7 million was allocated for re-establishment grants, $0.9 million for clean-up grants, $14.4 million for interest-free re-establishment loans, and $3.7 million for emergency and utility service grants.

Of the total of 185 businesses which received financial and management advice from IRAP, 182 continue today and total employment levels have increased from 3,920 in July 1987 to 4,276 in May 1990. Other support included, when necessary, stress management counselling and other forms of management advice. Three years after the tornado, employment levels are up by 10 per cent; investment has increased by $35 million over and above the financial support issued for disaster damage; and businesses have used a planning process which has resulted in modernization and more viable, productive and efficient business operations.

Many lessons were learned as a result of the experiences gained through IRAP which have application to similar disasters in future. First, business analysts must act with compassion and understanding and remember the traumatic circumstances faced by people in the process of re-establishing their livelihood. Second, assistance guidelines must be flexible enough to address each tragedy on a case-by-case basis. IRAP also proved that a recovery program can be successful in helping businesses operate at levels equal to or greater than those before the disaster. The single focal point of contact demonstrated its effectiveness in co-ordinating all necessary expertise to each and every business. Finally, the business community became much more aware of its insurance needs and the insurance industry in turn became more aware of the education requirements for both agents and clients.

Insurance Bureau of Canada

This is an edited version of a report submitted by Alan D. Wood, F.I.I.C., regional vice-president for the Prairies and Northwest Territories, Insurance Bureau of Canada.

The Alberta Claims Emergency Response Plan (CERP) program is part of a nationwide plan to provide for timely and effective response by the property and casualty insurance industry in the event of an insured emergency situation. Although the operations of the plan are co-ordinated by the Insurance Bureau of Canada (IBC), membership in the various regional committees is composed of representatives from all segments of the industry — companies, agents and brokers.

In Alberta, there is an Alberta committee, which also doubles as the Calgary subcommittee, and five regional subcommittees. Meetings of the various CERP committees in Alberta had been held on a rather haphazard basis.

The Alberta committee met on July 6, 1987, and determined that regular meetings of the committees must take place. The first such meeting was held by the Edmonton subcommittee on July 28, 1987. No one envisioned just how fortuitous that meeting would be. We reviewed the Barrie, Ontario, tornado report and, basically, went through the procedures that would be followed in the event of an emergency.

Three days later, we had our emergency.

Response

Less than three hours after the tornado struck, the Alberta CERP committee chairman was on his way to Edmonton from Calgary, and by 2200 hours a meeting of the Edmonton subcommittee had been arranged for 0930 hours the following morning in the IBC Edmonton boardroom. IBC in Toronto had also been advised that a possible Level III emergency had occurred.

Day 1, Saturday, August 1

By 0900 hours the next morning, the president of IBC had declared a Level III emergency, which provided the CERP committee the basic authority to do whatever had to be done to help both the industry and the victims in dealing with the disaster.

The first order of business at the first meeting that morning was to determine the extent of damage. It appeared that about 300 homes and mobile homes had been completely destroyed by the tornado, with numerous other residences suffering severe damage. News reports indicated that the industrial loss was severe.

It was also apparent that there was substantial residential and vehicle damage by hail and wind throughout the city and surrounding area. We were aware that we must act quickly and responsibly in giving direction to

the industry and the victims and that this would not be a normal claims situation. The industry would be operating under a microscope for the next while and must work together if we were to deal effectively with the situation.

The IBC office was designated the central command point and 'edmonton telephones' was asked to install six additional phones running off the IBC telephone number. These were operational by noon.

The following priorities were established:

1) A press release should be issued immediately concerning temporary repairs and protection of property and the fact that victims should keep the bills for this, since they would be reimbursed for such reasonable expenses.
2) A meeting with Edmonton-area claims managers should be arranged immediately to acquaint them with the types of claims they could expect, to request that their offices be open to accept claims throughout the weekend and to inform them of the role CERP would be playing.
3) Area brokers were to be contacted to confirm their offices were open for reporting of claims.
4) It was necessary to find out where severely damaged or destroyed vehicles were being taken by police — these were being bulldozed and hauled away in the continuing search for victims.
5) Consider asking the IBC Appraisal Centre to set up a remote location for vehicle appraisals.
6) Insurance companies must report their daily claims totals to the Edmonton IBC office so that the true size of the disaster, from an insurance standpoint, could be determined as quickly as possible.
7) All media requests should be referred to the Alberta chairman or the Edmonton vice-chairman to eliminate the possibility of conflicting statements or reports that could cause confusion for the victims.
8) Other emergency centres (city, county, police, etc.) should be advised of our operations and requested to refer all insurance problems or questions to IBC.
9) Separate liaisons between CERP and independent adjusters, company claims managers/adjusters, and independent brokers should be appointed.
10) The Edmonton vice-chairman should work with IBC communication consultants in arranging press releases, press conferences, etc.
11) A damage estimate should not be released until more information was available.
12) The Alberta chairman should take a helicopter flight over the damaged area.

Following the meeting, a press release was designed by the IBC communications consultants to be aired as a radio commercial on all area radio stations. This was hand-delivered at noon. All stations agreed to run it and it went on the air shortly after 1300 hours.

Additional telephone lines were installed and tied into IBC's rotary system, for a total of 10 lines, and volunteers were obtained to take calls. One problem immediately became apparent — the additional phones were single sets and had to be answered individually.

The majority of phone calls received were from consumers wondering what to do — could they make emergency repairs, could we help them track down their broker or company, etc. Many people with minor damage called to ask if it was O.K. if they didn't report their claim for a few days. A steady stream of media calls came in seeking information, damage estimates, and extent of coverage.

A large newspaper ad was prepared for both local dailies advising victims on what they should do to protect property. It appeared in the Sunday (August 2) and Monday editions.

A meeting with approximately 25 company claims managers or senior personnel took place that afternoon (Saturday). Suggestions for settlement of certain types of claims were discussed and agreed to. These "guidelines" were not to be binding, but were simply to be used as a means of establishing consistency in adjusting procedures. In many cases the guidelines developed provided for a more generous settlement than a consumer might receive in a normal claims situation.

Those in attendance were asked to refer all media calls to IBC, or at least to check with IBC before responding to the media to confirm that their response would be consistent with that of the CERP committee.

Following the meeting, the Alberta chairman and several members of the CERP committee toured the devastated area by helicopter to get a complete picture of the extent of damage.

At 1830 hours a press conference was held to advise the media what the industry was doing to deal with the disaster and to confirm that most of the damage would be covered under the peril of windstorm. Earlier media reports suggested that the damage was not insured because it was an "Act of God". We wanted to reassure the victims that no such exclusion existed and that their policies would respond to their claims.

An initial damage estimate of $50 million was released, but it was indicated that we expected the figure to increase considerably as more complete information became available. It was noted that police still would not allow us access to the mobile home park or the industrial area — hence our difficulty in developing a more accurate figure.

Day 2, Sunday, August 2

The Command Centre re-opened at 0700 hours Sunday morning with all IBC staff and volunteers present.

The CERP committee met at 0900 hours for an update on the situation. A representative from the Economical Mutual in Kitchener, Ontario, also attended and advised the committee on some of the problems that might develop based on his experience following a tornado in Barrie, Ontario, two years earlier.

The committee agreed that advance payments by insurers would be of substantial psychological benefit to victims.

It was also agreed that a package should be sent to area industry personnel to inform them of everything the CERP committee had done. The kit would include copies of all press releases. This should help maintain consistency within the industry.

The industry was very co-operative in seeking direction from the CERP committee and in keeping the committee posted on what was happening in the field. Companies were phoning with initial information on number and type of claims reported. Most company and broker offices had opened Saturday and Sunday, and many victims received advance payments and emergency funds from their insurers during that period.

The ability to report claims immediately, even though it was a long weekend, was a tremendous psychological boost to victims. It also allowed the claims people to get a jump on the situation.

Access to the industrial area and mobile home park was still denied by the authorities, which meant some difficulties in dealing with victims in those areas.

In a meeting with IBC communications consultants, it was decided to commence immediately production of a video on the activities of the CERP committtee, IBC and the industry.

Day 3, Monday, August 3

The Command Centre opened at 0800 hours with telephones already ringing.

The CERP committtee meeting was convened at 0900 hours. The chairman warned that the mood of claimants regarding their losses would probably begin to change (become tougher) as the week progressed and the initial shock wore off.

The governments had requested that we supply a representative for the two planned Victim Assistance Centres.

While most of the work of the committee to this point had dealt with residential damage, a great number of vehicles had also been damaged in the storm. Arrangements had been made with the Edmonton IBC automobile appraisal centres to look after the needs of consumers with vehicle damage. Field appraisals were being made in total loss situations. If the need became apparent, the appraisal centres were prepared to open mobile centres. Concern was expressed over the Alberta Written Off Vehicle Act and its requirement to report all total losses. Hail damage to vehicles could result in a large number of vehicles written off solely due to cosmetic damage. Alberta Transportation would be contacted regarding an exemption from reporting requirements to reduce paperwork that might impede claims settlement.

A meeting with representatives from independent adjusting firms convened at 1030 hours. Considerable discussion took place on industrial area damage, since independent adjusters would be quite active in those adjustments. Those who had been able to get into the area confirmed that many buildings that did not show any apparent damage had, in fact, suffered structural damage. Many had been lifted into the air and then gently dropped back into place. Hidden structural damage could be a serious concern. Most of the businesses affected appeared to have good insurance protection, including business interruption.

At the Command Centre, some victims reported that contractors had shown up advising that they had been sent by their insurance company to commence repairs. As this was a total scam, a news release was issued warning victims to be on the watch for this. The release obviously worked, as no further calls on this problem were received.

The volume of calls coming in to the centre appeared to be dropping. This was attributed to the excellent media coverage of the press releases advising victims of the steps to take.

Meanwhile, two representatives of Western Union Insurance Company offered to serve as insurance representatives for the Victim Assistance Centres at M.E. LaZerte Composite High School and in the County of Strathcona.

A revised damage estimate of $150 million was released to the press, with the caveat that the full extent of industrial damage had not yet been ascertained.

[redacted] Day 4, Tuesday, August 4

The nature of consumer calls had changed. Calls during the previous three days were generally victims wondering what to do. Calls received today were much more specific and related to the adjusting process.

A few victims called to say they had expected an adjuster and/or contractor to show up but no one came. In retrospect, the insurance industry was still making appointments as if it were a normal claims scenario. Appointments were made that would be impossible to keep. We had forgotten that there was more to the storm than just the tornado. The extent of the hail and wind damage throughout the area was just becoming apparent.

Alberta Public Safety Services requested that we advise the industry that victims with uninsurable or uninsured losses should be directed to the Victim Assistance Centres. They also advised that the premier had made some commitments that could result in them supplying relief that they might not otherwise have considered. Normally, they would not pay for a loss that was uninsured but for which insurance was available. Because of the scope of the disaster, they might be in the position of paying claims for any uninsured loss, whether or not it could have been insured.

The media had approached several industry personnel for permission to have a camera crew go out with an adjuster. In all cases, the companies called the vice-chairman of the Alberta CERP committee for approval. Approval was immediate and some very positive television footage resulted.

It should be noted that the media were very patient in waiting for interviews and information from us. They were very appreciative of the fact that they could come to one source for all their information and that they could be secure in knowing that everyone was getting the same information.

Besides the tornado calls, a significant number of calls came in from other areas of the province from consumers questioning their own insurance programs and whether or not they had sufficient coverage to protect against a similar disaster.

Adjusters were concerned about continued restricted access to heavily damaged areas. Authorities indicated that complete access would probably be available the next day.

From this point on, the days were spent dealing with little emergencies that cropped up and simply responding to the thousands of calls from victims seeking advice or just some assurance that everything was proceeding as it should. The job of the CERP committee had virtually ended.

Several further CERP meetings were held in the days to come to monitor the situation but the industry had the situation well in hand.

On Thursday, August 6, IBC Toronto advised that, based on the loss information received from members, a computer projection developed an insured loss damage estimate of $250 million. This would break down to about $100 million personal property and vehicles and $150 million

commercial. A press release was issued with the reminder that, since claims could be filed up to a year after the tornado, final figures would not be available until early 1989.

From the projected figures, it would appear that this storm would be the most expensive disaster ever reported in Canada.

A video recreating the first week of activity by the CERP committee was made. Entitled "Without Warning", it has been shown around the world at various insurance meetings and conventions. Even though it was intended as an instructional tool for the insurance industry, it has also been shown by numerous public television and specialty cable stations.

A news release was issued in July 1988 to wrap up the tornado from our perspective and also to remind claimants that storm-related claims must be presented before July 31, 1988. The damage total remained at $250 million, involving in excess of 63,000 claims.

References

Chen, T. The 1987 summer severe weather report for Alberta and northeastern British Columbia. Edmonton: Atmospheric Environment Service, Alberta Weather Centre, 1988.

Edmonton Inter Health Agency Disaster Response Plan. Document produced by the Edmonton Health Care Advisory Committee.

Fujita, T.T. Proposed characterization of tornadoes and hurricanes by area and intensity. University of Chicago SMRP Research Paper No. 91, 1971.

Hage, K.D. A comparative study of tornadoes and other destructive windstorms in Alberta and Saskatchewan, Proceedings of the Symposium/Workshop on Impact of Climate Variability and Change on the Canadian Prairies. Edmonton: Alberta Environment, 1988.

Hage, K.D. Review of the weather warning system associated with the Edmonton tornado of July 31, 1987. Edmonton: Atmospheric Environment Service, Alberta Weather Centre, 1987.

Industrial Recovery Assistance Final Report. Alberta Public Safety Services and Alberta Economic Development and Trade. Edmonton: Alberta Public Safety Services, 1990.

Lowe, A.B. and G.A. McKay. The tornadoes of Western Canada. Ottawa: Queen's Printer, 1962.

Newark, M.J. Tornado disasters. Paper presented at the Conference on Emergency Preparedness for the Eighties, Toronto, November 16-19, 1980.

Scanlon, J., Gural, M. and Khordoc, C. Mass casualty management and the Edmonton tornado. Ottawa: Emergency Communications Research Unit, Carleton University, 1987.

Wallace, A. Track of the Edmonton tornado, Friday, July 31, 1987 — Preliminary report. Edmonton: Atmospheric Environment Service, Western Region, Technical Note 87-N-079, 1987.